SCPI Command Reference

Agilent Technologies
E4428C/38C ESG Signal Generators

This guide applies to the following signal generator models:

E4428C ESG Analog Signal Generator

E4438C ESG Vector Signal Generator

Due to our continuing efforts to improve our products through firmware and hardware revisions, signal generator design and operation may vary from descriptions in this guide. We recommend that you use the latest revision of this guide to ensure you have up-to-date product information. Compare the print date of this guide (see bottom of page) with the latest revision, which can be downloaded from the following website:

http://www.agilent.com/find/esg

Notice: This document contains references to Agilent. Please note that Agilent's Test and Measurement business has become Keysight Technologies. For more information, go to www.keysight.com.

Agilent Technologies

Manufacturing Part Number: E4400-90622

Printed in USA

April 2015

Notice

SCPI Command Reference, Volume 1

Contents

Contents

Contents

Contents

Contents

Contents

Documentation Overview

Installation Guide

- Safety Information
- Getting Started
- Operation Verification
- Regulatory Information

User's Guide

- E4428C Analog Signal Generator Overview
- E4423C Analog Signal Generator Overview
- Basic Operation
- Basic Digital Operation
- AWGN Waveform Generator
- Analog Modulation
- Digital Signal Interface Module
- Bluetooth Signals
- BERT
- CDMA Digital Modulation
- GPS Modulation
- Multitone Waveform Generator
- Custom Digital Modulation
- Real Time TDMA Formats
- W-CDMA Digital Modulation for Component Test
- W-CDMA Uplink Digital Modulation for Receiver Test
- W-CDMA Downlink Digital Modulation for Receiver Test
- Troubleshooting

Programming Guide

- Getting Started with Remote Operation
- Using IO Interfaces
- Programming Examples
- Programming the Status Register System
- Creating and Downloading Waveform Files
- Creating and Downloading User-Data Files

SCPI Reference

Volume 1:

- SCPI Basics
- Basic Function Commands
- System Commands
- Analog Commands
- Component Test Digital Commands

Volume 2:

- Digital Signal Interface Module Commands
- Bit Error Rate Test (BERT) Commands
- Receiver Test Digital Commands

Volume 3:

- Receiver Test Digital Commands (continued)

Compatibility with E44xxB SCPI Commands

- Overview
- E4428C/38C SCPI Commands
- ESG E44xxB Commands
- 8648A/B/C/D Commands
- 8658B, 8657A/B/D/J Programming Codes

Service Guide

- Troubleshooting
- Replaceable Parts
- Assembly Replacement
- Post-Repair Procedures
- Safety and Regulatory

Key and Data Field Reference

Volume 1:

- Symbols, Numerics, A-H

Volume 2:

- Volume 2: I-Z

1 SCPI Basics

This chapter describes how SCPI information is organized and presented in this guide. An overview of the SCPI language is also provided. This Chapter contains the following major sections:

- "Command Reference Information" on page 2
- "SCPI Basics" on page 3

Command Reference Information

SCPI Command Listings

The Table of Contents lists the Standard Commands for Programmable Instruments (SCPI) without the parameters. The SCPI subsystem name will generally have the first part of the command in parenthesis that is repeated in all commands within the subsystem. The title(s) beneath the subsystem name is the remaining command syntax. The following example demonstrates this listing:

Communication Subsystem (:SYSTem:COMMunicate)
:PMETer:CHANnel
:SERial:ECHO

The following examples show the complete commands from the above Table of Contents listing:

:SYSTem:COMMunicate:PMETer:CHANnel
:SYSTem:COMMunicate:SERial:ECHO

Key and Data Field Cross Reference

The index is set up so applicable key and data field names can be cross-referenced to the appropriate SCPI command. There are two headings in the index where the key and data field names can be found:

- individual softkey, hardkey, or data field name
- subsystem name

Supported Field

Within each command section, the Supported heading describes which signal generator configurations are supported by the SCPI command. When “All Models” is shown next to this heading, all signal generator configurations are supported by the SCPI command. When “All with Option xxx” is shown next to this heading, only the stated option(s) is supported.

SCPI Basics

This section describes the general use of the SCPI language for the ESG. It is not intended to teach you everything about the SCPI language; the SCPI Consortium or IEEE can provide that level of detailed information. For a list of the specific commands available for the signal generator, refer to the table of contents.

For additional information, refer to the following publications:

- IEEE Standard 488.1-1987, IEEE Standard Digital Interface for Programmable Instrumentation. New York, NY, 1998.
- IEEE Standard 488.2-1992, IEEE Standard Codes, Formats, Protocols and Command Commands for Use with ANSI/IEEE Standard 488.1-1987. New York, NY, 1998.

Common Terms

The following terms are used throughout the remainder of this section:

Command	A command is an instruction in SCPI consisting of mnemonics (keywords), parameters (arguments), and punctuation. You combine commands to form messages that control instruments.
Controller	A controller is any device used to control the signal generator, for example a computer or another instrument.
Event Command	Some commands are events and cannot be queried. An event has no corresponding setting; it initiates an action at a particular time.
Program Message	A program message is a combination of one or more properly formatted commands. Program messages are sent by the controller to the signal generator.
Query	A query is a special type of command used to instruct the signal generator to make response data available to the controller. A query ends with a question mark. Generally you can query any command value that you set.
Response Message	A response message is a collection of data in specific SCPI formats sent from the signal generator to the controller. Response messages tell the controller about the internal state of the signal generator.

Command Syntax

A typical command is made up of keywords prefixed with colons (:). The keywords are followed by parameters. The following is an example syntax statement:

[:SOURce]:POWer[:LEVel] MAXimum|MINimum

In the example above, the [:LEVel] portion of the command immediately follows the :POWer portion with no separating space. The portion following the [:LEVel], MINimum|MAXimum, are the parameters (argument for the command statement). There is a separating space (white space) between the command and its parameter.

Additional conventions in syntax statements are shown in Table 1-1 and Table 1-2.

Table 1-1 Special Characters in Command Syntax

<table>
<tr><th>Characters</th><th>Meaning</th><th>Example</th></tr>
<tr><td>|</td><td>A vertical stroke between keywords or parameters indicates alterative choices. For parameters, the effect of the command varies depending on the choice.</td><td>[:SOURce]:AM:
MOD DEEP|NORMal

DEEP or NORMal are the choices.</td></tr>
<tr><td>[ ]</td><td>Square brackets indicate that the enclosed keywords or parameters are optional when composing the command. These implied keywords or parameters will be executed even if they are omitted.</td><td>[:SOURce]:FREQuency[:CW]?

SOURce and CW are optional items.</td></tr>
<tr><td>< ></td><td>Angle brackets around a word (or words) indicate they are not to be used literally in the command. They represent the needed item.</td><td>[:SOURce]:FREQuency:
STARt <val><unit>

In this command, the words <val> and <unit> should be replaced by the actual frequency and unit.

:FREQuency:STARt 2.5GHZ</td></tr>
<tr><td>{ }</td><td>Braces indicate that parameters can optionally be used in the command once, several times, or not at all.</td><td>[:SOURce]:LIST:
POWer <val>{,<val>}

a single power listing:
LIST:POWer 5
a series of power listings:
LIST:POWer 5,10,15,20</td></tr>
</table>

SCPI Basics

Table 1-2 Command Syntax

Characters, Keywords, and Syntax	Example
Upper-case lettering indicates the minimum set of characters required to execute the command.	[:SOURce]:FREQuency[:CW]?, FREQ is the minimum requirement.
Lower-case lettering indicates the portion of the command that is optional; it can either be included with the upper-case portion of the command or omitted. This is the flexible format principle called forgiving listening. Refer to "Command Parameters and Responses" on page 7 for more information.	:FREQuency Either :FREQ, :FREQuency, or :FREQUENCY is correct.
When a colon is placed between two command mnemonics, it moves the current path down one level in the command tree. Refer to "Command Tree" on page 6 more information on command paths.	:TRIGger:OUTPut:POLarity? TRIGger is the root level keyword for this command.
If a command requires more than one parameter, you must separate adjacent parameters using a comma. Parameters are not part of the command path, so commas do not affect the path level.	[:SOURce]:LIST: DWELl <val>{,<val>}
A semicolon separates two commands in the same program message without changing the current path.	:FREQ 2.5GHZ;:POW 10DBM
White space characters, such as <tab> and <space>, are generally ignored as long as they do not occur within or between keywords. However, you must use white space to separate the command from the parameter, but this does not affect the current path.	:FREQ uency or :POWer :LEVel are not allowed. A <space> between :LEVel and 6.2 is mandatory. :POWer:LEVel 6.2

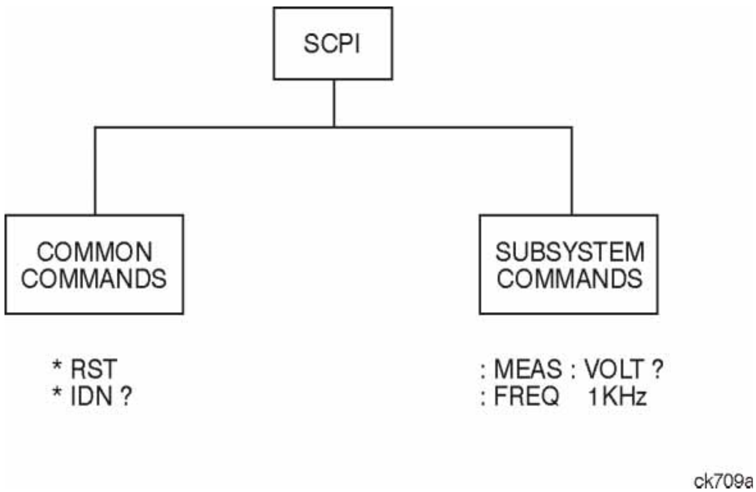
Command Types

Commands can be separated into two groups: common commands and subsystem commands. Figure 1-1, shows the separation of the two command groups.

Common commands are used to manage macros, status registers, synchronization, and data storage and are defined by IEEE 488.2. They are easy to recognize because they all begin with an asterisk. For example *IDN?, *OPC, and *RST are common commands. Common commands are not part of any subsystem and the signal generator interprets them in the same way, regardless of the current path setting.

Subsystem commands are distinguished by the colon (`:`). The colon is used at the beginning of a command statement and between keywords, as in `:FREQuency[:CW?]`. Each command subsystem is a set of commands that roughly correspond to a functional block inside the signal generator. For example, the power subsystem (`:POWer`) contains commands for power generation, while the status subsystem (:STATus) contains commands for controlling status registers.

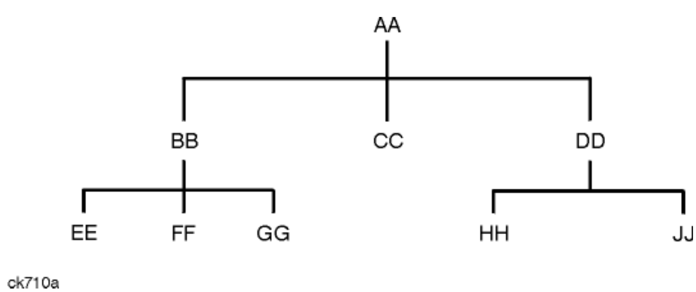
Figure 1-1 Command Types



Command Tree

Most programming tasks involve subsystem commands. SCPI uses a structure for subsystem commands similar to the file systems on most computers. In SCPI, this command structure is called a command tree and is shown in Figure 1-2.

Figure 1-2 Simplified Command Tree



The command closest to the top is the root command, or simply “the root.” Notice that you must follow a particular path to reach lower level commands. In the following example, `:POWer` represents AA, `:ALC` represents BB, `:SOURce` represents GG. The complete command path is `:POWer:ALC:SOURce?` (:AA:BB:GG).

Paths Through the Command Tree

To access commands from different paths in the command tree, you must understand how the signal generator interprets commands. The parser, a part of the signal generator firmware, decodes each message sent to the signal generator. The parser breaks up the message into component commands using a set of rules to determine the command tree path used. The parser keeps track of the current path (the level in the command tree) and where it expects to find the next command statement. This is important because the same keyword may appear in different paths. The particular path is determined by the keyword(s) in the command statement.

A message terminator, such as a `<new line>` character, sets the current path to the root. Many programming languages have output statements that automatically send message terminators.

NOTE The current path is set to the root after the line-power is cycled or when `*RST` is sent.

Command Parameters and Responses

SCPI defines different data formats for use in program and response messages. It does this to accommodate the principle of forgiving listening and precise talking. For more information on program data types refer to IEEE 488.2.

Forgiving listening means the command and parameter formats are flexible.

For example, with the `:FREQuency:REFerence:STATe ON|OFF|1|0` command, the signal generator accepts `:FREQuency:REFerence:STATe ON`, `:FREQuency:REFerence:STATe 1`, `:FREQ:REF:STAT ON`, `:FREQ:REF:STAT 1` to turn on the frequency reference mode.

Each parameter type has one or more corresponding response data types. A setting that you program using a numeric parameter returns either real or integer response data when queried. Response data (data returned to the controller) is more concise and restricted, and is called precise talking.

Precise talking means that the response format for a particular query is always the same.

For example, if you query the power state (`:POWer:ALC:STATe?`) when it is on, the response is always 1, regardless of whether you previously sent `:POWer:ALC:STATe 1` or `:POWer:ALC:STATe ON`. Table 1-3 shows the response for a given parameter type.

Table 1-3 Parameter and Response Types

Parameter Types	Response Data Types
Numeric	Real, Integer
Extended Numeric	Real, Integer
Discrete	Discrete
Boolean	Numeric Boolean
String	String

Numeric Parameters

Numeric parameters are used in both common and subsystem commands. They accept all commonly used decimal representations of numbers including optional signs, decimal points, and scientific notation.

If a signal generator setting is programmed with a numeric parameter which can only assume a finite value, it automatically rounds any entered parameter which is greater or less than the finite value. For example, if a signal generator has a programmable output impedance of 50 or 75 ohms, and you specified 76.1 for the output impedance, the value is rounded to 75. The following are examples of numeric parameters:

100	no decimal point required
100.	fractional digits optional
–1.23	leading signs allowed
4.56E<space>3	space allowed after the E in exponential
–7.89E–001	use either E or e in exponential
+256	leading + allowed
.5	digits left of decimal point optional

Extended Numeric Parameters

Most subsystems use extended numeric parameters to specify physical quantities. Extended numeric parameters accept all numeric parameter values and other special values as well.

The following are examples of extended numeric parameters:

SCPI Basics

100	any simple numeric value
1.2GHZ	GHZ can be used for exponential (E009)
200MHZ	MHZ can be used for exponential (E006)
–100mV	negative 100 millivolts
10DEG	10 degrees

Extended numeric parameters also include the following special parameters:

DEFault	resets the parameter to its default value
UP	increments the parameter
DOWN	decrements the parameter
MINimum	sets the parameter to the smallest possible value
MAXimum	sets the parameter to the largest possible value

Discrete Parameters

Discrete parameters use mnemonics to represent each valid setting. They have a long and a short form, just like command mnemonics. You can mix upper and lower case letters for discrete parameters.

The following examples of discrete parameters are used with the command `:TRIGger[:SEQuence]:SOURce BUS|IMMediate|EXTernal`.

BUS	GPIB, LAN, or RS-232 triggering
IMMediate	immediate trigger (free run)
EXTernal	external triggering

Although discrete parameters look like command keywords, do not confuse the two. In particular, be sure to use colons and spaces properly. Use a colon to separate command mnemonics from each other and a space to separate parameters from command mnemonics.

The following are examples of discrete parameters in commands:

```
TRIGger:SOURce BUS
TRIGger:SOURce IMMediate
TRIGger:SOURce EXTernal
```

SCPI Basics

Boolean Parameters

Boolean parameters represent a single binary condition that is either true or false. The two-state boolean parameter has four arguments. The following list shows the arguments for the two-state boolean parameter:

ON	boolean true, upper/lower case allowed
OFF	boolean false, upper/lower case allowed
1	boolean true
0	boolean false

String Parameters

String parameters allow ASCII strings to be sent as parameters. Single or double quotes are used as delimiters.

The following are examples of string parameters:

```
'This is valid'

"This is also valid"

'SO IS THIS'
```

Real Response Data

Real response data represent decimal numbers in either fixed decimal or scientific notation. Most high-level programming languages that support signal generator input/output (I/O) handle either decimal or scientific notation transparently.

The following are examples of real response data:

+4.000000E+010, –9.990000E+002

–9.990000E+002

+4.0000000000000E+010

+1

0

SCPI Basics

Integer Response Data

Integer response data are decimal representations of integer values including optional signs. Most status register related queries return integer response data.

The following are examples of integer response data:

0	signs are optional
+100	leading + allowed
–100	leading – allowed
256	never any decimal point

Discrete Response Data

Discrete response data are similar to discrete parameters. The main difference is that discrete response data only returns the short form of a particular mnemonic, in all upper case letters.

The following are examples of discrete response data:

IMM

EXT

INT

NEG

Numeric Boolean Response Data

Boolean response data returns a binary numeric value of one or zero.

String Response Data

String response data are similar to string parameters. The main difference is that string response data returns double quotes, rather than single quotes. Embedded double quotes may be present in string response data. Embedded quotes appear as two adjacent double quotes with no characters between them.

The following are examples of string response data:

```
"This is a string"

"one double quote inside brackets: [""]"

"Hello!"
```

Program Messages

The following commands will be used to demonstrate the creation of program messages:

```
[:SOURce]:FREQuency:STARt        [:SOURce]:FREQuency:STOP
[:SOURce]:FREQuency[:CW]         [:SOURce]:POWer[:LEVel]:OFFSet
```

Example 1

```
:FREQuency:STARt 500MHZ;STOP 1000MHZ
```

This program message is correct and will not cause errors; `STARt` and `STOP` are at the same path level. It is equivalent to sending the following message:

```
FREQuency:STARt 500MHZ;FREQuency:STOP 1000MHZ
```

Example 2

```
:POWer 10DBM;:OFFSet 5DB
```

This program message will result in an error. The message makes use of the default `POWer[:LEVel]` node (root command). When using a default node, there is no change to the current path position. Since there is no command `OFFSet` at the root level, an error results.

The following example shows the correct syntax for this program message:

```
:POWer 10DBM;:POWer:OFFSet 5DB
```

Example 3

```
:POWer:OFFSet 5DB;POWer 10DBM
```

This program message results in a command error. The path is dropped one level at each colon. The first half of the message drops the command path to the lower level command `OFFSet`; `POWer` does not exist at this level.

The `POWer 10DBM` command is missing the leading colon and when sent, it causes confusion because the signal generator cannot find `POWer` at the `POWer:OFFSet` level. By adding the leading colon, the current path is reset to the root. The following shows the correct program message:

```
:POWer:OFFSet 5DB;:POWer 10DBM
```

Example 4

```
FREQ 500MHZ;POW 4DBM
```

In this example, the keyword short form is used. The program message is correct because it utilizes the default nodes of `:FREQ[:CW]` and `:POW[:LEVel]`. Since default nodes do not affect the current path, it is not necessary to use a leading colon before `FREQ` or `POW`.

SCPI Basics

File Name Variables

File name variables designate a data file and file path. File name variables are used in the SCPI command syntax whenever files are accessed. The name of the file is always required, but the file path can sometimes be optional or be designated using different formats. The following table shows these different file path formats:

Format	File Name Variable	Example
Format 1	`"<file name>"`	`"Test_Data"`
Format 2	`"<file name@msus>"`	`"Test_Data@SEQ"`
Format 3	`"<msus:file name>"`	`"SEQ:Test_Data"`
Format 4	`"</user/directory/file name>"`	`"/USER/SEQ/Test_Data"`

Formats 2–4 offer programming flexibility and are equivalent. Format 1 can only be used with SCPI commands that imply the path name as part of the command syntax. Typically, SCPI load commands that access user-data files do not need to have a file path designated.

See Table 1-4 on page 14 for information on file types and directories.

NOTE The maximum length for a file name is 23 characters, excluding the file path.

Example Using Format 1

```
:CORR:FLAT:LOAD "FLAT_DATA"
```

The preceding example loads user-flatness data from a file called FLAT_DATA located in the USERFLAT directory. No file path is needed as the command syntax implies the directory where the file is located.

Example Using Format 2

```
:MEM:COPY "IQ_DATA@NVWFM","Test_DATA@WFM1"
```

The preceding example copies a file named IQ_DATA located in the WAVEFORM directory to a file named Test_DATA in volatile waveform memory (WFM1).

Example Using Format 3

```
:MEM:COPY "NVWFM:IQ_DATA","WFM1:Test_DATA"
```

The preceding example copies a file named IQ_DATA located in the WAVEFORM directory to a file named Test_DATA in volatile waveform memory (WFM1).

SCPI Basics

Example Using Format 4

```
:MEM:COPY "/USER/WAVEFORM/IQ_DATA","/USER/BBG1/WAVEFORM/IQ_DATA"
```

The preceding example copies a file named `IQ_DATA` located in the `WAVEFORM` directory to a file named `IQ_DATA` in volatile waveform memory (`WFM1`).

The following examples show commands, with different formats, that can be used to download a waveform file named `Test_Data` into the signal generator's volatile waveform memory (WFM1):

Command Syntax Format 3

```
:MEMory:DATA "WFM1:Test_Data",#ABC
```

Command Syntax Format 4

```
:MEMory:DATA "/USER/BBG1/WAVEFORM/Test_Data",#ABC
```

These commands are equivalent. The data block, #ABC, is described as follows:

`#`	This character indicates the beginning of the data block
`A`	Number of digits in the byte count B
`B`	Byte count in C
`C`	Waveform data

Refer to ":DATA" on page 105 and the *E4428C/38C ESG Signal Generators Programming Guide* for more information on data blocks and downloading waveform data.

File Types and Directory Structure

The signal generator uses a computer directory model structure for file storage. The top level directory is called the `USER` directory. All other directories are subdirectories located under the `USER` directory. Each subdirectory is dedicated to the type of data stored. For example, the `FIR` directory is used to store finite impulse filter (FIR) coefficient data whereas the `MARKERS` directory is used to store marker data.

The following table lists signal generator the subdirectories and file paths where file types are stored.

Table 1-4 File Types and Directory Structures

File System	File Type	File Path	MSUS Path
BINARY[a]	BIN	/USER/BIN	BINARY:[b]
BIT[a]	BIT	/USER/BIT	BIT:

Table 1-4 File Types and Directory Structures

File System	File Type	File Path	MSUS Path
CDMA[ab]	CDMA	/USER/CDMA	CDMA:
DMOD - ARB digital modulation file[a]	DMOD	/USER/DMOD	DMOD:
DWCDMA - ARB downlink W-CDMA file[a]	DWCD	/USER/DWCDMA	DWCDMA:
FCDMA - ARB forward link cdma2000 file[a]	FCDM	/USER/FCDMA	FCDMA:
FIR - finite impulse response filter file	FIR	/USER/FIR	FIR:
FSK - frequency shift keying modulation file[a]	FSK	/USER/FSK	FSK:
HDR1 - volatile arbitrary waveform header file[a]	HDR1	/USER/BBG1/HEADER	HDR1:
I/Q - modulation file[a]	IQ	/USER/IQ	IQ:
LIST - sweep list file	LIST	/USER/LIST	LIST:
MCDMA - ARB multicarrier CDMA file[a]	MCDM	/USER/MCDMA	MCDMA:
MDMOD - ARB multicarrier digital modulation file[a]	MDM	/USER/MDMOD	MDMOD:
MDWCDMA - ARB multicarrier downlink W-CDMA file[a]	MDWC	/USER/MDWCDMA	MDWCDMA:
MFCDMA - ARB multicarrier forward link cdma2000 file[a]	MFCD	/USER/MFCDMA	MFCDMA:
MKR1 - volatile arbitrary waveform marker file[a]	MKR1	/USER/BBG1/MARKERS	MKR1:
MTONE - ARB multitone file[a]	MTON	/USER/MTONE	MTONE:
NVHDR - non-volatile arbitrary waveform header file[a]	NVHDR	/USER/HEADER	NVHDR:
NVMKR - non-volatile arbitrary waveform marker file[a]	NVMKR	/USER/MARKERS	NVMKR:

Table 1-4 File Types and Directory Structures

File System	File Type	File Path	MSUS Path
NVWFM - non-volatile arbitrary waveform file[a]	NVWFM	/USER/WAVEFORM	NVWFM:
RCDMA - ARB reverse link cdma2000 file[a]	RCDM	/USER/RCDM	RCDM:
SEQ - ARB sequence file[a]	SEQ	/USER/SEQ	SEQ:
SHAPE - burst shape file[a]	SHAP	/USER/SHAPE	SHAPE:
STATE	STAT	/USER/STATE	STATE:
USERFLAT - user-flatness file	UFLT	/USER/USERFLAT	USERFLAT:
UWCDMA - ARB uplink W-CDMA file[a]	UWCD	/USER/UWCDMA	UWCDMA:
WFM1 - waveform file[a]	WFM1	/USER/BBG1/WAVEFORM	WFM1:

a. This feature does not apply to the E4428C.
b. This msus designator is optional.

MSUS (Mass Storage Unit Specifier) Variable

The variable `"<msus>"` enables a command to be file type specific when working with user files. Some commands use it as the only command parameter, while others can use it in conjunction with a file name when a command is not file type specific. When used with a file name, it is similar to Format 2 in the "File Name Variables" section on page 13. The difference is the file type specifier (msus) occupies its own variable and is not part of the file name syntax.

The following examples illustrate the usage of the variable `"<msus>"` when it is the only command parameter:

Command Syntax with the msus variable

```
:MMEMory:CATalog? "<msus>"
```

Command Syntax with the file system

```
:MMEMory:CATalog? "LIST:"
```

The variable `"<msus>"` is replaced with `"LIST:"`. When the command is executed, the output displays only the files from the List file system.

SCPI Basics

The following examples illustrate the usage of the variable "<file name>" with the variable "<msus>":

*Command Syntax with the file name and msus variable*s

```
:MMEMory:DELete[:NAME] "<file name>",["<msus>"]
```

Command Syntax with the file name and file system

```
:MMEMory:DELete:NAME "LIST_1","LIST:"
```

The command from the above example cannot discern which file system LIST_1 belongs to without a file system specifier and will not work without it. When the command is properly executed, LIST_1 is deleted from the List file system.

The following example shows the same command, but using Format 2 from the "File Name Variables" section on page 13:

```
:MMEMory:DELete:NAME "LIST_1@LIST"
```

When a file name is a parameter for a command that is not file system specific, either format ("<file name>","<msus>" or "<file name@msus>") will work.

Refer to Table 1-4 on page 14 for a listing of the file systems and types.

Quote Usage with SCPI Commands

As a general rule, programming languages require that SCPI commands be enclosed in double quotes as shown in the following example:

```
":FM:EXTernal:IMPedance 600"
```

However when a string is the parameter for a SCPI command, additional quotes or other delimiters may be required to identify the string. Your programming language may use two sets of double quotes, one set of single quotes, or back slashes with quotes to signify the string parameter. The following examples illustrate these different formats:

`"MEMory:LOAD:LIST ""myfile"""` used in BASIC programming languages

`"MEMory:LOAD:LIST \"myfile\""` used in C, C++, Java, and PERL

`"MEMory:LOAD:LIST 'myfile'"` accepted by most programming languages

Consult your programming language reference manual to determine the correct format.

Binary, Decimal, Hexadecimal, and Octal Formats

Command values may be entered using a binary, decimal, hexadecimal, or octal format. When the binary, hexadecimal, or octal format is used, their values must be preceded with the proper identifier. The decimal format (default format) requires no identifier and the signal generator assumes this format when a numeric value is entered without one. The following list shows the identifiers for the formats that require them:

- #B identifies the number as a binary numeric value (base-2).
- #H identifies the number as a hexadecimal alphanumeric value (base-16).
- #Q identifies the number as a octal alphanumeric value (base-8).

The following are examples of SCPI command values and identifiers for the decimal value 45:

#B101101	binary equivalent
#H2D	hexadecimal equivalent
#Q55	octal equivalent

The following example sets the RF output power to 10 dBm (or the equivalent value for the currently selected power unit, `such as DBUV` or `DBUVEMF`) using the hexadecimal value 000A:

```
:POW #H000A
```

A unit of measure, such as `DBM` or `mV`, will not work with the values when using a format other than decimal.

The following example sets the bluetooth board address to FFBF7 (hexadecimal):

```
:RADio:BLUEtooth:ARB:BDADdr #HFFBF7
```

2 Basic Function Commands

This chapter provides SCPI descriptions for subsystems dedicated to signal generator operations common to most ESG Signal Generators. This chapter contains the following major sections:

Correction Subsystem ([:SOURce]:CORRection)

:FLATness:LOAD

Supported All Models

`[:SOURce]:CORRection:FLATness:LOAD "<file name>"`

This command loads a user-flatness correction file. The `"<file name>"` variable is the name of the file located in the Catalog of USERFLAT Files. The directory path is implied in the command and need not be specified in the variable name. For more information on file name syntax, refer to "File Name Variables" on page 13.

Key Entry **Load From Selected File**

:FLATness:PAIR

Supported All Models

`[:SOURce]:CORRection:FLATness:PAIR <freq>[<unit>],<corr>[<unit>]`

This command sets a frequency and amplitude correction pair.

`<corr.>` This variable is the power correction.

Range	Frequency	Standard	Option UNB
	Option 501: 100kHZ–1GHZ	–136 to 20DB	–136 to 25DB
	Option 502: 100kHZ–2GHZ	–136 to 20DB	–136 to 25DB
	Option 503: 100kHZ–3GHZ	–136 to 20DB	–136 to 25DB
	Option 504: 100kHZ–4GHZ	–136 to 20DB	–136 to 25DB
	Option 506: 100kHZ–6GHZ	–136 to 25DB	N/A

Key Entry **Configure Cal Array**

Remarks The maximum number of points that can be entered is 1601. Options 501, 502, and 504 are specific to the E4438C.

:FLATness:POINts

Supported All Models

`[:SOURce]:CORRection:FLATness:POINts?`

This query returns the number of points in the user-flatness correction file.

:FLATness:PRESet

Supported All Models

CAUTION The current correction data will be overwritten once this command is executed. Save the current data if needed. Refer to ":FLATness:STORe" on page 21 for storing user-flatness files.

`[:SOURce]:CORRection:FLATness:PRESet`

This command presets the user-flatness correction to a factory-defined setting that consists of one point.

Key Entry **Preset List**

:FLATness:STORe

Supported All Models

`[:SOURce]:CORRection:FLATness:STORe "<file name>"`

This command stores the current user-flatness correction data to a file named be the `:CORRection:FLATness:STORe`. The directory path is implied in the command and need not be specified in the `"<file name>"` variable.

Key Entry **Store To File**

Remarks For information on file name syntax, refer to "File Name Variables" on page 13.

[:STATe]

Supported All Models

`[:SOURce]:CORRection[:STATe] ON|OFF|1|0`

`[:SOURce]:CORRection[:STATe]?`

This command enables or disables the user-flatness corrections.

***RST** 0

Key Entry **Flatness Off On**

Digital Modulation Subsystem—E4438C ([:SOURce])

:BURSt:SOURce

Supported E4438C

```
[:SOURce]:BURSt:SOURce EXT[1]|INT[1]
[:SOURce]:BURSt:SOURce?
```

This command selects either an internally generated or an externally supplied burst source.

***RST** EXT

Key Entry **Burst Envelope Int Ext Off**

Remarks The external burst source is applied to the EXT 1 INPUT connector.

The INT[1] choice will not work unless an internal burst source is active.

:BURSt:STATe

Supported E4438C

```
[:SOURce]:BURSt:STATe ON|OFF|1|0
[:SOURce]:BURSt:STATe?
```

This command enables or disables the burst envelope function.

***RST** 0

Key Entry **Burst Envelope Int Ext Off**

:DM:EXTernal:ALC:BANDwidth|BWIDth

Supported All Models

NOTE Refer to the *Programming Compatibility Guide* for information on this command. This command was replaced by the ":ALC:BANDwidth|BWIDth" command shown on page 58 and the ":ALC:BANDwidth" command on page 59.

:DM:EXTernal:HCRest[:STATe]

Supported E4438C

```
[:SOURce]:DM:EXTernal:HCRest[:STATe] ON|OFF|1|0
[:SOURce]:DM:EXTernal:HCRest[:STATe]?
```

This command changes the operating condition to accommodate I/Q inputs with a high crest factor.

ON(1) This choice turns high crest mode on for externally applied signals with high crest factors. High crest mode allows the signal generator to process these signals with less distortion. For crest factors higher than 4 dB, I/Q drive levels should be reduced by 1 dB for each dB above that level. In high crest mode, the maximum output level is reduced and power level accuracy is degraded.

OFF(0) This choice disables the high crest mode.

***RST** 0

Key Entry **High Crest Mode Off On**

:DM:EXTernal:FILTer

Supported E4438C

```
[:SOURce]:DM:EXTernal:FILTer 40e6|THRough
[:SOURce]:DM:EXTernal:FILTer?
```

This command selects the filter or through path for I/Q signals routed to the rear panel I and Q outputs. Selecting a filter using this command will automatically set ":DM:EXTernal:FILTer:AUTO" on page 23 to OFF(0) mode.

40e6 This choice applies a 40 MHz baseband filter.

THRough This choice bypasses filtering.

***RST** THR

Key Entry **40.000 MHz** **Through**

:DM:EXTernal:FILTer:AUTO

Supported E4438C

```
[:SOURce]:DM:EXTernal:FILTer:AUTO ON|OFF|1|0
[:SOURce]:DM:EXTernal:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals routed to the rear panel outputs.

ON(1)	This choice will automatically select a digital modulation filter optimized for the current signal generator settings.
OFF(0)	This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to “:DM:EXTernal:FILTer” on page 23 for selecting a filter or through path.
***RST**	1
Key Entry	**I/Q Output Filter Manual Auto**

:DM:EXTernal:POLarity

Supported E4438C

```
[:SOURce]:DM:EXTernal:POLarity NORMal|INVert
[:SOURce]:DM:EXTernal:POLarity?
```

This command sets the phase polarity for the I/Q signal.

***RST**	NORM
Key Entry	**Int Phase Polarity Normal Invert**
Remarks	This command is for backward compatibility with the appropriate ESG E44xxB.

:DM:EXTernal:SOURce

Supported E4438C

```
[:SOURce]:DM:EXTernal:SOURce EXTernal|INTernal|BBG1|EXT600|OFF|SUM
[:SOURce]:DM:EXTernal:SOURce?
```

This command selects the I/Q signal source that is routed to the rear panel I and Q output connectors.

EXTernal	This choice routes a portion of the externally applied signals at the 50 ohm I and Q input connectors to the rear panel I and Q output connectors.
INTernal	This choice is for backward compatibility with the appropriate ESG E44xxB and performs the same function as the BBG1 selection.
BBG1	This choice routes a portion of the baseband generator I/Q signals to the rear panel I and Q connectors and requires Option 001/601or 002/602.
EXT600	This choice routes a portion of the externally applied signals at the 600 ohm I and Q input connectors to the rear panel I and Q output connectors.
OFF	This choice disables the output to the rear panel I and Q output connectors.

SUM	This choice routes a portion of the summed I/Q signals from source one and two, to the rear panel I and Q output connectors. See “:DM:SRATio” on page 36 for setting the summing ratio of the I/Q signals between source one and two.
***RST**	EXT
Key Entry	**Ext 50 Ohm** **BBG1** **Ext 600 Ohm** **Off** **Sum**
Remarks	The output is the analog component of the I and Q signals. For selecting the I/Q source, refer to “:DM:SOURce” on page 35.

:DM:IQADjustment:BBG:QSKew

Supported	E4438C with Option 001/601or 002/602

```
[:SOURce]:DM:IQADjustment:BBG:QSKew <val><unit>
[:SOURce]:DM:IQADjustment:BBG:QSKew?
```

This command affects both the rear-panel I and Q signals, and the RF output path by adjusting the phase angle (quadrature skew) of the Q vector.

Positive skew increases the angle from 90 degrees while negative skew decreases the angle from 90 degrees. When the quadrature skew is zero, the phase angle between the I and Q vectors is 90 degrees.

The `<val>` variable has a minimum resolution of 0.1. The command works with or without the unit variable.

Example

```
:DM:IQAD:BBG:QSK 4.5DEG
```

The preceding example increases the phase angle by 4.5 degrees.

***RST**	+0.00000000E+000
Range	–30 to 30DEG
Key Entry	**Quadrature Angle Adjustment**
Remarks	This command is effective only if the state of the I/Q adjustment function is set to ON. Refer to “:DM:IQADjustment[:STATe]” on page 32.
	To change the quadrature skew on only the RF output path, see “:DM:IQADjustment:QSKew” on page 30.

:DM:IQADjustment:EXTernal:COFFset

Supported E4438C

```
[:SOURce]:DM:IQADjustment:EXTernal:COFFset <val>
[:SOURce]:DM:IQADjustment:EXTernal:COFFset?
```

This command sets the common mode offset voltage for both the in-phase (I) and quadrature-phase (Q) signals going to the rear panel I and Q output connectors.

The variable <val> is expressed in units of volts (mV–V).

***RST**	+0.00000000E+000
Range	–3 to 3
Key Entry	**Common Mode I/Q Offset**
Remarks	This command is effective only if the state of the I/Q adjustment function is set to ON. Refer to ":DM:IQADjustment[:STATe]" on page 32.

:DM:IQADjustment:EXTernal:DIOFfset

Supported E4438C

```
[:SOURce]:DM:IQADjustment:EXTernal:DIOFfset <val>
[:SOURce]:DM:IQADjustment:EXTernal:DIOFfset?
```

This command sets the differential offset voltage for an in-phase (I) signal routed to the I output connectors.

The variable <val> is expressed in units of volts (mV–V).

***RST**	+0.00000000E+000
Range	–3 to 3
Key Entry	**Diff. Mode I Offset**

Remarks This command is effective only if the state of the I/Q adjustment function is set to ON. Refer to ":DM:IQADjustment[:STATe]" on page 32.

:DM:IQADjustment:EXTernal:DQOFfset

Supported E4438C

```
[:SOURce]:DM:IQADjustment:EXTernal:DQOFfset <val>
[:SOURce]:DM:IQADjustment:EXTernal:DQOFfset?
```

This command sets the differential offset voltage for a quadrature-phase (Q) signal routed to the Q output connectors.

***RST** +0.00000000E+000

Range –4 to 4

Key Entry **Diff. Mode Q Offset**

Remarks This command is effective only if the state of the I/Q adjustment function is set to ON. Refer to ":DM:IQADjustment[:STATe]" on page 32.

:DM:IQADjustment:EXTernal:GAIN

Supported E4438C

```
[:SOURce]:DM:IQADjustment:EXTernal:GAIN <val>
[:SOURce]:DM:IQADjustment:EXTernal:GAIN?
```

This command sets the I/Q gain ratio for signals routed to the rear panel I and Q output connectors.

The variable <val> is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –4 to 4

Key Entry **I/Q Out Gain Balance**

Remarks This command is effective only if the state of the I/Q adjustment function is set to ON. Refer to ":DM:IQADjustment[:STATe]" on page 32.

:DM:IQADjustment:EXTernal:IOFFset

Supported E4438C

```
[:SOURce]:DM:IQADjustment:EXTernal:IOFFset <val>
[:SOURce]:DM:IQADjustment:EXTernal:IOFFset?
```

This command sets the offset voltage for a signal applied to the 600 ohm I input connector.

The variable <val> is expressed in units of volts (mV–V).

***RST** +0.00000000E+000

Key Entry **Ext In 600 Ohm I Offset**

Range –5 to 5

Remarks This command is effective only if the state of the I/Q adjustment function is set to ON. Refer to ":DM:IQADjustment[:STATe]" on page 32.

:DM:IQADjustment:EXTernal:IQATten

Supported E4438C

```
[:SOURce]:DM:IQADjustment:EXTernal:IQATten <val>
[:SOURce]:DM:IQADjustment:EXTernal:IQATten?
```

This command sets the I/Q output attenuation level.

The variable <val> is expressed in units of decibels (dB).

***RST** +6.00000000E+000

Range 0–40

Key Entry **I/Q Output Atten**

Remarks The value set by this command is active even if the I/Q adjustment function is off.

:DM:IQADjustment:EXTernal:QOFFset

Supported E4438C

```
[:SOURce]:DM:IQADjustment:EXTernal:QOFFset <val>
[:SOURce]:DM:IQADjustment:EXTernal:QOFFset?
```

This command sets the offset voltage for a signal applied to the 600 ohm Q input connector.

The variable <val> is expressed in units of volts (mV–V).

***RST** +0.00000000E+000

Range –5 to 5

Key Entry **Ext In 600 Ohm Q Offset**

Remarks This command is effective only if the state of the I/Q adjustment function is set to ON. Refer to ":DM:IQADjustment[:STATe]" on page 32.

:DM:IQADjustment:GAIN

Supported E4438C

```
[:SOURce]:DM:IQADjustment:GAIN <val>
[:SOURce]:DM:IQADjustment:GAIN?
```

This command sets the gain for the I signal relative to the Q signal.

The variable <val> is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –4 to 4

Key Entry **I/Q Gain Balance Source 1**

Remarks This command is effective only if the state of the I/Q adjustment function is set to ON. Refer to ":DM:IQADjustment[:STATe]" on page 32.

:DM:IQADjustment:IOFFset

Supported E4438C

```
[:SOURce]:DM:IQADjustment:IOFFset <val>
[:SOURce]:DM:IQADjustment:IOFFset?
```

This command adjusts the I channel offset value.

The variable `<val>` is expressed in units of percent with a minimum resolution of 0.025.

***RST** +0.00000000E+000

Range –50.000 to 50.000

Key Entry **I Offset**

Remarks When using this command to minimize the LO feedthrough signal, optimum performance is achieved when the command is sent after all other I/Q path commands are executed, such as those that change the internal phase polarity or adjust the modulator attenuator. If other adjustments are made after minimizing is performed, the LO feedthrough signal may increase.

This command is effective only if the state of the I/Q adjustment function is set to ON. Refer to ":DM:IQADjustment[:STATe]" on page 32.

:DM:IQADjustment:QOFFset

Supported E4438C

```
[:SOURce]:DM:IQADjustment:QOFFset
[:SOURce]:DM:IQADjustment:QOFFset?
```

This command adjusts the Q channel offset value.

The variable <val> is expressed in units of percent with a minimum resolution of 0.025.

***RST** +0.00000000E+000

Range –50.000 to 50.000

Key Entry **Q Offset**

Remarks When using this command to minimize the LO feedthrough signal, optimum performance is achieved when the command is sent after all other I/Q path commands are executed, such as those that change the internal phase polarity or adjust the modulator attenuator. If other adjustments are made after minimizing is performed, the LO feedthrough signal may increase.

This command is effective only if the state of the I/Q adjustment function is set to ON. Refer to ":DM:IQADjustment[:STATe]" on page 32.

:DM:IQADjustment:QSKew

Supported E4438C

```
[:SOURce]:DM:IQADjustment:QSKew <val>
[:SOURce]:DM:IQADjustment:QSKew?
```

This command adjusts the phase angle (quadrature skew) between the I and Q vectors by increasing or decreasing the Q phase angle. It affects only the RF output path.

If the signal generator is operating at frequencies greater than 3.3 GHz, quadrature skew settings greater than ±5 degrees will not be within specifications.

Positive skew increases the angle from 90 degrees while negative skew decreases the angle from 90 degrees. When the quadrature skew is zero, the phase angle between the I and Q vectors is 90 degrees.

The `<val>` variable is expressed in degrees with a minimum resolution of 0.1.

Example

```
:DM:IQAD:QSK 4.5
```

The preceding example increases the phase angle by 4.5 degrees.

***RST** +0.00000000E+000

Range –1E1 to +1E1

Key Entry **Quadrature Angle Adjustment**

Remarks This command is effective only if the state of the I/Q adjustment function is set to ON. Refer to ":DM:IQADjustment[:STATe]" on page 32.

To change the quadrature skew for both the rear-panel I and Q signals, and RF output path, see ":DM:IQADjustment:BBG:QSKew" on page 25 (requires Option 001/601 or 002/602).

:DM:IQADjustment:SKEW

Supported E4438C

```
[:SOURce]:DM:IQADjustment:SKEW[:DELay] <val>
[:SOURce]:DM:IQADjustment:SKEW?
```

This command changes the input skew which is a time delay difference between the I and Q signals. Equal and opposite skew is applied to both I and Q and affects the RF Output and I/Q output paths simultaneously. A positive value delays the I signal relative to the Q signal, and a negative value delays the Q signal relative to the I signal.

If the internal I/Q correction path is set to RF or BB the I/Q signals are already optimized and adjusting I/Q skew would add an impairment to the signals. If the internal I/Q correction path is set to Off, then adjusting the I/Q skew could improve the I/Q signals. The I/Q skew adjustment cannot be performed on the MSK, FSK, and C4FM constant envelope modulations.

I/Q skew adjustments are preserved when the instrument state is saved. I/Q skew adjustments are also preserved when instrument settings are changed. If the signal generator is calibrated, the skew adjustments are added to the calibration value used for the given signal generator state. If the signal generator is uncalibrated, the skew adjustments are re-applied directly.

Using I/Q skew while playing a user FIR file greater than 32 symbols will generate an error.

The variable <val> is expressed in seconds. Range limits are determined by the modulation configuration but is limited to a maximum of ± 2 seconds.

Example

```
:DM:IQAD:SKEW .5
```

The preceding example sets the time delay difference between the I and Q signals to 500 milliseconds.

***RST** +0.00000000E+000

Key Entry **I/Q Timing Skew**

:DM:IQADjustment:SKEW:Path

Supported E4438C

```
[:SOURce]:DM:IQADjustment:SKEW:PATH RF BB
[:SOURce]:DM:IQADjustment:SKEW?
```

This command selects either the RF or BB (baseband) path as the path to which skew timing corrections will be applied. If there are no factory I/Q timing skew corrections data, then adjusting the I/Q timing skew for the selected path may improve the error vector magnitude (EVM) of the signal. Refer to the ":DM:IQADjustment:SKEW" on page 31 for more information.

If internal I/Q corrections are available for the RF or external I/Q output (BB) path then the I/Q signals are already optimized and adjusting I/Q skew for either path would add an impairment to the signal.

Example

```
:DM:IQAD:SKEW:PATH RF
```

The preceding example selects the RF path as the path to which skew timing adjustments will be made.

***RST** +0.00000000E+000

Key Entry **I/Q Timing Skew Path**

:DM:IQADjustment[:STATe]

Supported E4438C

```
[:SOURce]:DM:IQADjustment[:STATe] ON|OFF|1|0
[:SOURce]:DM:IQADjustment[:STATe]?
```

This command enables or disables the I/Q adjustments.

Example

```
:DM:IQAD 1
```

The preceding example enables I/Q adjustments.

***RST** 0

Key Entry **I/Q Adjustments Off On**

:DM:MODulation:FILTer

Supported E4438C

```
[:SOURce]:DM:MODulation:FILTer 2.1e6|40e6|THRough
[:SOURce]:DM:MODulation:FILTer?
```

This command enables you to select a filter or through path for I/Q signals modulated onto the RF carrier. Selecting a filter with this command automatically sets ":DM:MODulation:FILTer:AUTO" to OFF(0).

2.1E6	This choice applies a 2.1 MHz baseband filter to the I/Q signals.
40E6	This choice applies a 40 MHz baseband filter to the I/Q signals.
THRough	This choice bypasses filtering.
***RST**	THR
Key Entry	**2.100 MHz** **40.000 MHz** **Through**

:DM:MODulation:FILTer:AUTO

Supported E4438C

```
[:SOURce]:DM:MODulation:FILTer:AUTO ON|OFF|1|0
[:SOURce]:DM:MODulation:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals modulated onto the RF carrier.

ON(1)	This choice will automatically select a digital modulation filter.
OFF(0)	This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to ":DM:MODulation:FILTer" on page 32 for selecting a filter or through path.
***RST**	1
Key Entry	**I/Q Mod Filter Manual Auto**

:DM:MODulation:ATTen

Supported E4438C

```
[:SOURce]:DM:MODulation:ATTen <val>
[:SOURce]:DM:MODulation:ATTen?
```

This command attenuates the I/Q signals being modulated through the signal generator RF path.

The variable <val> is expressed in units of decibels (dB).

***RST**	+2.00000000E+000
Range	0–40
Key Entry	**Modulator Atten Manual Auto**

:DM:MODulation:ATTen:AUTO

Supported E4438C

```
[:SOURce]:DM:MODulation:ATTen:AUTO ON|OFF|1|0
[:SOURce]:DM:MODulation:ATTen:AUTO?
```

This command enables or disables the I/Q attenuation auto mode.

ON (1) This choice enables the attenuation auto mode which optimizes the modulator attenuation for the current conditions.

OFF (0) This choice holds the attenuator at its current setting or at a selected value. Refer to ":DM:MODulation:ATTen" on page 33 for setting the attenuation value.

***RST** 1

Key Entry **Modulator Atten Manual Auto**

:DM:POLarity[:ALL]

Supported E4438C

```
[:SOURce]:DM:POLarity[:ALL] NORMal|INVert
[:SOURce]:DM:POLarity?
```

This command sets the digital modulation phase polarity.

NORMal This choice selects normal phase polarity for the I and Q signals.

INVert This choice flips the I and Q signals by routing the I signal to the Q input of the I/Q modulator and the Q signal to the I input.

***RST** NORM

Key Entry **Int Phase Polarity Normal Invert**

:DM:SKEW:PATH

Supported E4438C

```
[:SOURce]:DM:SKEW:PATH RF|BB
[:SOURce]:DM:SKEW:PATH?
```

This command selects the skew path.

RF	When RF is selected, the skew is optimized for the I/Q signal applied to the RF Output. The BB output will be functional, but the I/Q timing skew applied will be optimized for the RF path. When using this choice, seven symbols of latency are added to the Arb based waveform. While in real-time mode, the maximum number of user symbols for the FIR is limited to 32.
BB	When BB is selected, the skew is optimized for the I/Q signal outputs on the rear panel. The RF Output will be functional, but the I/Q timing skew applied will be optimized for the BB path. When using this choice, seven symbols of latency are added to the Arb based waveform. While in real-time mode, the maximum number of user symbols for the FIR is limited to 32.
***RST**	INT
Key Entry	**Int I/Q Skew Corrections RF BB Off**

:DM:SKEW[:STATe]

Supported E4438C

```
[:SOURce]:DM:SKEW[:STATe] ON|OFF|1|0
[:SOURce]:DM:SKEW[:STATe]?
```

This command enables or disables the I/Q timing skew correction function.

***RST**	1
Key Entry	**Int I/Q Skew Corrections RF BB Off**

:DM:SOURce

Supported E4438C

```
[:SOURce]:DM:SOURce[1]|2 EXTernal|INTernal|BBG1|EXT600|OFF
[:SOURce]:DM:SOURce?
```

This command selects the I/Q modulator source.

EXTernal	This choice selects a 50 ohm impedance for the I and Q input connectors and routes the applied signals to the I/Q modulator.

INTernal	This choice is for backward compatibility with the appropriate ESG E44xxB and performs the same function as the BBG1 selection.
BBG1	This choice selects the baseband generator as the source for the I/Q modulator and requires Option 001/601or 002/602.
EXT600	This choice selects a 600 ohm impedance for the I and Q input connectors and routes the applied signals to the I/Q modulator.
OFF	This choice disables the digital modulation source.
***RST**	EXT
Key Entry	**Ext 50 Ohm** **BBG1** **Ext 600 Ohm** **Off**

:DM:SRATio

Supported E4438C

```
[:SOURce]:DM:SRATio <val><unit>
[:SOURce]:DM:SRATio?
```

This command sets the power level difference (ratio) between the source one and source two signals when the two signals are summed together. A positive ratio value reduces the amplitude for source two, while a negative ratio value reduces the amplitude for source one.

The range for the summing ratio is dependent on the modulator attenuator (mod atten) setting for the signal generator that is summing the signals together. The minimum range is achieved when the modulator attenuator setting is zero and the maximum range is reached when the maximum attenuator value is used. The range can be calculated using the following formula:

± Range = 50 dB + Mod Atten

***RST**	+0.00000000E+000
Range	*Min*: ± 50 dB *Max*: ± 90 dB
Key Entry	**Summing Ratio (SRC1/SRC2) x.xx dB**
Remarks	For real-time modulation format modulator attenuator settings, see “:DM:MODulation:ATTen” on page 33 and “:DM:MODulation:ATTen:AUTO” on page 34. For an Arb modulation format modulator attenuator setting, refer to the SCPI command subsystem for the Arb format being used and find the commands that contain the command mnemonics IQ:MODulation:ATTen.

:DM:STATe

Supported	E4438C

```
[:SOURce]:DM:STATe ON|OFF|1|0
[:SOURce]:DM:STATe?
```

This command enables or disables the I/Q modulator.

ON (1)	This choice enables the internal I/Q modulator.
OFF (0)	This choice disables the internal I/Q modulator. You can turn off the I/Q modulation with this choice even though a digital modulation format is enabled. With this configuration, the RF output signal will not be modulated, but the I/Q signals may be present at the rear panel I and Q outputs depending on the rear panel output selection.
***RST**	0
Key Entry	**I/Q Off On**
Remarks	The I/Q modulator is enabled whenever a digital format is turned on.
	The `I/Q` annunciator will be shown on the signal generator display whenever the I/Q modulator is on.

Frequency Subsystem ([:SOURce])

:FREQuency:CHANnels:BAND

Supported All Models

```
[:SOURce]:FREQuency:CHANnels:BAND NBASe|NMOBile|BPGSm|MPGSm|BEGSm|MEGSm|
BRGSm|MRGSm|BDCS|MDCS|BPCS|MPCS|B450|GM450|B480|M480|B850|M850|B8|M8|B15
|M15|B390|B420|B460|B915|M380|M410|M450|M870|PHS|DECT
[:SOURce]:FREQuency:CHANnels:BAND?
```

This command sets the frequency of the signal generator by specifying a frequency channel band.

NBASe	This choice selects Standard Base as the frequency band for NADC.
NMOBile	This choice selects Standard Mobile as the frequency band for NADC.
BPGSm	This choice selects P-Gsm 900 Base as the frequency band for GSM.
MPGSm	This choice selects P-Gsm 900 Mobile as the frequency band for GSM.
BEGSm	This choice selects E-Gsm 900 Base as the frequency band for GSM.
MEGSm	This choice selects E-Gsm 900 Mobile as the frequency band for GSM.
BRGSm	This choice selects R-Gsm 900 Base as the frequency band for GSM.
MRGSm	This choice selects R-Gsm 900 Mobile as the frequency band for GSM.
BDCS	This choice selects DCS 1800 Base as the frequency band for GSM.
MDCS	This choice selects DCS 1800 Mobile as the frequency band for GSM.
BPCS	This choice selects PCS 1900 Base as the frequency band for GSM.
MPCS	This choice selects PCS 1900 Mobile as the frequency band for GSM.
B450	This choice selects Gsm 450 Base as the frequency band for GSM.
GM450	This choice selects Gsm 450 Mobile as the frequency band for GSM.
B480	This choice selects Gsm 480 Base as the frequency band for GSM.
M480	This choice selects Gsm 480 Mobile as the frequency band for GSM.
B850	This choice selects Gsm 850 Base as the frequency band for GSM.
M850	This choice selects Gsm 850 Mobile as the frequency band for GSM.
B8	This choice selects 800MHz Base as the frequency band for PDC.

M8	This choice selects 800MHz Mobile as the frequency band for PDC.
B15	This choice selects 1500MHz Base as the frequency band for PDC.
M15	This choice selects 1500MHz Mobile as the frequency band for PDC.
B390	This choice selects Base 390-400 as the frequency band for TETRA.
B420	This choice selects Base 420-430 as the frequency band for TETRA.
B460	This choice selects Base 460-470 as the frequency band for TETRA.
B915	This choice selects Base 915-921 as the frequency band for TETRA.
M380	This choice selects Mobile 380-390 as the frequency band for TETRA.
M410	This choice selects Mobile 410-420 as the frequency band for TETRA.
M450	This choice selects Mobile 450-460 as the frequency band for TETRA.
M870	This choice selects Mobile 870-876 as the frequency band for TETRA.
PHS	This choice selects Standard PHS as the frequency band.
DECT	This choice selects Standard DECT as the frequency band.

***RST** BPGS

Key Entry

P-GSM Base **E-GSM Base** **R-GSM Base** **DCS Base**
PCS Base **GSM 450 Base** **GSM 480 Base** **GSM 850 Base**
NADC Base **800MHZ Base** **1500MHZ Base**
Tetra Base 390/400 **Tetra Base 420/430** **Tetra Base 460/470**
Tetra Base 915/921 **PHS Standard** **DECT Standard**
P-GSM Mobile **E-GSM Mobile** **R-GSM Mobile** **DCS Mobile**
PCS Mobile **GSM 450 Mobile** **GSM 480 Mobile** **GSM 850 Mobile**
NADC Mobile **800MHZ Mobile** **1500MHZ Mobile**
Tetra Mobile 380/390 **Tetra Mobile 410/420** **Tetra Mobile 450/460**
Tetra Mobile 870/876

Remarks The frequency channel state must be enabled for this command to work. Refer to “:FREQuency:CHANnels[:STATe]” on page 41.

:FREQuency:CHANnels:NUMBer

Supported All Models

```
[:SOURce]:FREQuency:CHANnels:NUMBer <number>
[:SOURce]:FREQuency:CHANnels:NUMBer?
```

This command sets the frequency of the signal generator by specifying a channel number of a given frequency band.

***RST** +1

Range

	P-GSM Base/Mobile:	1–24
	E-GSM and R-GSM Base/Mobile:	1–1023
	DCS Base/Mobile:	512–885
	PCS Base/Mobile:	512–900
	GSM-450 Base/Mobile:	259–293
	GSM-480 Base/Mobile:	306–340
	GSM-850 Base/Mobile:	128–251
	NADC Base/Mobile:	1–1023
	800MHZ Base/Mobile:	0–640
	1500MHZ Base/Mobile:	0–960
	TETRA 380/390 Mobile:	3600–4000
	TETRA 390/4000 Base:	3600–4000
	TETRA 410/420 Mobile:	800–1200
	TETRA 420/430 Base:	800–1200
	TETRA 460/470: 2400 through 2800	2400–2800
	TETRA 870/876 Mobile:	600–640
	TETRA 915/921 Base:	600–940
	PHS Standard:	1–255
	DECT Standard:	0–9

Key Entry **Channel Number**

Remarks The frequency channel state must be enabled for this command to work. Refer to ":FREQuency:CHANnels[:STATe]" on page 41.

:FREQuency:CHANnels[:STATe]

Supported All Models

```
[:SOURce]:FREQuency:CHANnels[:STATe] ON|OFF|1|0
[:SOURce]:FREQuency:CHANnels[:STATe]?
```

This command enables or disables the frequency channel and band selection to set the output frequency.

***RST** 0

Key Entry **Freq Channels Off On**

Remarks To set frequency channels band refer to ":FREQuency:CHANnels:BAND" on page 38.

:FREQuency:FIXed

Supported All Models

```
[:SOURce]:FREQuency:FIXed <val><unit>|UP|DOWN
[:SOURce]:FREQuency:FIXed?
```

This command sets the signal generator output frequency, or increments or decrements the current RF frequency setting.

`<val>` A frequency value.

`UP` Increases the current frequency setting by the value set with the ":FREQuency[:CW]:STEP[:INCRement]" command found on page 47. The front-panel up-arrow key performs the same function.

`DOWN` Decreases the current frequency setting by the value set with the ":FREQuency[:CW]:STEP[:INCRement]" command found on page 47. The front-panel down-arrow key performs the same function.

***RST** Option 501: +1000000000000E+09

Option 502: +2000000000000E+09

Option 503: +3000000000000E+09

Option 504: +4000000000000E+09

Option 506: +6000000000000E+09

Range E4438C Option 501: 100kHZ–1GHZ

E4438C Option 502: 100kHZ–2GHZ

Option 503: 100kHZ–3GHZ

E4438C Option 504: 100kHZ–4GHZ

Option 506: 100kHZ–6GHZ

Remarks To set the frequency mode to FIXed, refer to ":FREQuency:MODE" on page 42.

A frequency change may affect the current output power. Refer to "[:LEVel][:IMMediate][:AMPLitude]" on page 69 for the correct specified frequency and amplitude settings.

:FREQuency:MODE

Supported All Models

```
[:SOURce]:FREQuency:MODE CW|FIXed|LIST
[:SOURce]:FREQuency:MODE?
```

This command sets the frequency mode of the signal generator to CW or swept.

CW and FIXed These choices are synonymous with one another and stops a frequency sweep, allowing the ESG to operate at a set frequency. Refer to ":FREQuency[:CW]" on page 46 for setting the frequency in the CW mode and to ":FREQuency:FIXed" on page 41 for setting the frequency in the FIXed mode.

LIST This choice selects the swept frequency mode. If sweep triggering is set to immediate along with continuous sweep mode, executing the command starts the LIST or STEP frequency sweep.

NOTE To perform a frequency and amplitude sweep, you must also select LIST as the power mode. See ":MODE" on page 66 for selecting the list mode for an amplitude sweep.

***RST** CW

Key Entry **Frequency** **Freq** **Off**

:FREQuency:MULTiplier

Supported All Models

```
[:SOURce]:FREQuency:MULTiplier <val>
[:SOURce]:FREQuency:MULTiplier?
```

This command sets the multiplier for the signal generator carrier frequency.

***RST** +1.00000000E+000

Range Negative Values: –100 to –.001 Positive Values: .001–1000

Key Entry **Freq Multiplier**

Remarks For any multiplier other than one, the `MULT` indicator is shown in the frequency area of the display.

:FREQuency:OFFSet

Supported All Models

```
[:SOURce]:FREQuency:OFFSet <val><unit>
[:SOURce]:FREQuency:OFFSet?
```

This command sets the frequency offset.

The query of this command returns a value equal to the original output frequency times the multiplier value, plus the frequency offset value.

***RST** +0.00000000000000E+00

Range –200GHZ to 200GHZ

Key Entry **Freq Offset**

Remarks When an offset has been entered, the `OFFS` indicator is turned on in the frequency area of the display.

The frequency offset state is turned on when any non-zero value is entered; entering zero will turn it off. Refer to “:FREQuency:OFFSet:STATe” for setting the offset state independent of entering offset values.

:FREQuency:OFFSet:STATe

Supported All Models

```
[:SOURce]:FREQuency:OFFSet:STATe ON|OFF|1|0
[:SOURce]:FREQuency:OFFSet:STATe?
```

This command enables or disables the offset frequency.

***RST** 0

Key Entry **Freq Offset**

Remarks Entering OFF (0) will set the frequency offset to 0 Hz.

:FREQuency:REFerence

Supported All Models

```
[:SOURce]:FREQuency:REFerence <val><unit>
[:SOURce]:FREQuency:REFerence?
```

This command sets the output reference frequency.

***RST** +0.0000000000000E+00

Range Option 501: 0HZ–1GHZ

Option 502: 0HZ–2GHZ

Option 503: 0HZ–3GHZ

Option 504: 0HZ–4GHZ

Option 506: 0HZ–6GHZ

Key Entry **Freq Ref Set**

Remarks Options 501, 502, and 504 are specific to the E4438C.

:FREQuency:REFerence:STATe

Supported All Models

```
[:SOURce]:FREQuency:REFerence:STATe ON|OFF|1|0
[:SOURce]:FREQuency:REFerence:STATe?
```

This command enables or disables the frequency reference mode.

***RST** 0

Key Entry **Freq Ref Off On**

Remarks When the frequency reference mode is on, subsequent frequency parameters are set relative to the reference value.

:FREQuency:STARt

Supported All Models

```
[:SOURce]:FREQuency:STARt <val><unit>
[:SOURce]:FREQuency:STARt?
```

This command sets the first frequency point in a step sweep.

***RST** Option 501: +10000000000000E+09

Option 502: +20000000000000E+09

Option 503: +30000000000000E+09

Option 504: +40000000000000E+09

Option 506: +60000000000000E+09

Range Option 501: 100kHZ–1GHZ

Option 502: 100kHZ–2GHZ

Option 503: 100kHZ–3GHZ

	Option 504: 100kHZ–4GHZ
	Option 506: 100kHZ–6GHZ
Key Entry	**Freq Start**
Remarks	Options 501, 502, and 504 are specific to the E4438C.

:FREQuency:STOP

Supported All Models

```
[:SOURce]:FREQuency:STOP <val><unit>
[:SOURce]:FREQuency:STOP?
```

This command sets the last frequency point in a step sweep.

***RST**	Option 501: +1000000000000E+09
	Option 502: +2000000000000E+09
	Option 503: +3000000000000E+09
	Option 504: +4000000000000E+09
	Option 506: +6000000000000E+09
Range	Option 501: 100kHZ–1GHZ
	Option 502: 100kHZ–2GHZ
	Option 503: 100kHZ–3GHZ
	Option 504: 100kHZ–4GHZ
	Option 506: 100kHZ–6GHZ
Key Entry	**Freq Stop**
Remarks	Options 501, 502, and 504 are specific to the E4438C.

:FREQuency:SYNThesis

Supported E4438C except with Option UNJ

```
[:SOURce]:FREQuency:SYNThesis 1|2
[:SOURce]:FREQuency:SYNThesis?
```

This command sets the phase-lock loop (PLL) bandwidth to optimize phase noise for offsets above and below 10 kHz.

1	This choice will select mode 1 which optimize phase noise at offsets below 10 kHz.
2	This choice will select mode 2 which optimizes phase noise at offsets above

10 kHz.

***RST** +1

Key Entry **Mode 1 Optimize <10kHZ Offset** **Mode 2 Optimize >10kHZ Offset**

:FREQuency[:CW]

Supported All Models

```
[:SOURce]:FREQuency[:CW] <val><unit>|UP|DOWN
[:SOURce]:FREQuency[:CW]?
```

This command sets the signal generator output frequency for the CW frequency mode, or increments or decrements the current RF frequency setting.

`<val>` A frequency value.

`UP` Increases the current frequency setting by the value set with the ":FREQuency[:CW]:STEP[:INCRement]" command found on page 47. The front-panel up-arrow key performs the same function.

`DOWN` Decreases the current frequency setting by the value set with the ":FREQuency[:CW]:STEP[:INCRement]" command found on page 47. The front-panel down-arrow key performs the same function.

***RST**
Option 501: +10000000000000E+09
Option 502: +20000000000000E+09
Option 503: +30000000000000E+09
Option 504: +40000000000000E+09
Option 506: +60000000000000E+09

Range
E4438C Option 501: 100kHZ–1GHZ
E4438C Option 502: 100kHZ–2GHZ
Option 503: 100kHZ–3GHZ
E4438C Option 504: 100kHZ–4GHZ
Option 506: 100kHZ–6GHZ

Key Entry **Frequency**

Remarks To set the frequency mode to CW, refer to ":FREQuency:MODE" on page 42.

A frequency change may affect the current output power. Refer to "[:LEVel][:IMMediate][:AMPLitude]" on page 69 for the correct specified frequency and amplitude settings.

:FREQuency[:CW]:STEP[:INCRement]

Supported All Models

```
[:SOURce]:FREQuency[:CW]:STEP[:INCRement] <val><unit>
[:SOURce]:FREQuency[:CW]:STEP[:INCRement]?
```

This command sets the incremental step value for the frequency parameter.

Range .01 Hz–99 GHz

Key Entry **Incr Set**

Remarks The value set with this command is not affected by `*RST` or a power cycle.

:PHASe:REFerence

Supported All Models

```
[:SOURce]:PHASe:REFerence
```

This command sets the current output phase as a zero reference.

Key Entry **Phase Ref Set**

Remarks Subsequent phase adjustments are set relative to the new reference.

:PHASe[:ADJust]

Supported All Models

```
[:SOURce]:PHASe[:ADJust] <val><unit>
[:SOURce]:PHASe[:ADJust]?
```

This command adjusts the phase of the modulating signal.

The query will only return values in radians.

***RST** +0.00000000E+000

Range Radians: –3.14 to 3.14RAD Degrees: –180 to 179DEG

Key Entry **Adjust Phase**

:ROSCillator:SOURce

Supported All Models

```
[:SOURce]:ROSCillator:SOURce?
```

This command queries the source of the reference oscillator. It returns either INT (internal) or EXT (external).

:ROSCillator:SOURce:AUTO

Supported All Models except signal generators with Option UNJ

```
[:SOURce]:ROSCillator:SOURce:AUTO ON|OFF|1|0
[:SOURce]:ROSCillator:SOURce:AUTO?
```

This command enables or disables the ability of the signal generator to automatically select between the internal and an external reference oscillator.

ON (1) This choice enables the signal generator to detect when a valid reference signal is present at the 10 MHz IN connector and automatically switches from internal to external frequency reference.

OFF (0) This choice selects the internal reference oscillator and disables the switching capability between the internal and an external frequency reference.

***RST** 1

Key Entry **Ref Oscillator Source Auto Off On**

List/Sweep Subsystem ([:SOURce])

A complete sweep setup requires commands from other subsystems. Table 2-1 shows the function and location of these other commands.

Table 2-1 Location of Commands from the other Subsystems

Sweep Type	Function	Command Location	Key Entry under Sweep/List key
List and Step	Start/stop frequency sweep	":FREQuency:MODE" on page 42	**Freq Off**
	Start/stop amplitude sweep	":MODE" on page 66	**Ampl Off**
	Start/stop frequency and amplitude sweep[1]	":MODE" on page 66 ":FREQuency:MODE" on page 42	**Freq & Ampl Off**
	Set up and control sweep triggering[2]	"Trigger Subsystem" on page 166	See the "Trigger Subsystem"
List	Load a list sweep file	":LOAD:LIST" on page 123 and page 127	**Load From Selected File**
	Store list sweep data to a file	":STORe:LIST" on page 123 and page 127	**Store To File**
Step	Start frequency sweep	":FREQuency:STARt" on page 44	**Freq Start**
	Store list sweep data to a file	":STORe:LIST" on page 123 and page 127	**Store To File**
	Start amplitude sweep	":STARt" on page 67	**Ampl Start**
	Stop amplitude sweep	":STOP" on page 68	**Ampl Stop**

1. Execute both commands to start or stop a frequency and amplitude sweep.
2. For point to point triggering, see ":LIST:TRIGger:SOURce" on page 54.

:LIST:DIRection

Supported All Models

```
[:SOURce]:LIST:DIRection UP|DOWN
[:SOURce]:LIST:DIRection?
```

This command sets the direction of a list or step sweep.

UP This choice enables a sweep in an ascending order:

- first to last point for a list sweep
- start to stop for a step sweep

DOWN This choice reverses the direction of the sweep.

***RST** UP

Key Entry **Sweep Direction Down Up**

:LIST:DWELl

Supported All Models

```
[:SOURce]:LIST:DWELl <val>{,<val>}
[:SOURce]:LIST:DWELl?
```

This command sets the dwell time for the current list sweep points.

The variable <val> is expressed in units of seconds with a 0.001 resolution.

NOTE The dwell time (<val>) does not begin until the signal generator has settled for the current frequency and/or amplitude change.

Range 0.001–60

Remarks Dwell time is used when IMMediate is the trigger source. Refer to ":LIST:TRIGger:SOURce" on page 54 for the trigger setting.

The dwell time is the amount of time the sweep is guaranteed to pause after setting the frequency and/or power for the current point.

The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

:LIST:DWELl:POINts

Supported All Models

`[:SOURce]:LIST:DWELl:POINts?`

This command queries the signal generator for the number of dwell points in the current list sweep file.

:LIST:DWELl:TYPE

Supported All Models

`[:SOURce]:LIST:DWELl:TYPE LIST|STEP`

`[:SOURce]:LIST:DWELl:TYPE?`

This command toggles the dwell time for the list sweep points between the values defined in the list sweep and the value for the step sweep.

LIST This choice selects the dwell times from the list sweep. Refer to ":LIST:DWELl" on page 50 for setting the list dwell points.

STEP This choice selects the dwell time from the step sweep. Refer to ":SWEep:DWELl" on page 56 for setting the step dwell.

***RST** LIST

Key Entry **Dwell Type List Step**

:LIST:FREQuency

Supported All Models

`[:SOURce]:LIST:FREQuency <val>{,<val>}`

`[:SOURce]:LIST:FREQuency?`

This command sets the frequency values for the current list sweep points.

The variable <val> is expressed in units of Hertz.

Range Option 501: 100E3–1E9

Option 502: 100E3–2E9

Option 503: 100E3–3E9

Option 504: 100E3–4E9

Option 506: 100E3–6E9

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`. Options 501, 502, and 504 are specific to the E4438C.

The maximum number of list sweep points is 1,601.

:LIST:FREQuency:POINts

Supported All Models

`[:SOURce]:LIST:FREQuency:POINts?`

This command queries the current list sweep file for the number of frequency points.

:LIST:MANual

Supported All Models

```
[:SOURce]:LIST:MANual <val>
[:SOURce]:LIST:MANual?
```

This command sets a list or step sweep point as the current sweep point controlling the frequency and power output.

Range List Sweep: 1–1601 Step Sweep: 2-65535

Key Entry **Manual Point**

Remarks If list or step mode is controlling frequency or power, or both, then the indexed point in the respective list(s) will be used.

Entering a value with this command will have no effect, unless MANual is the selected mode. Refer to ":LIST:MODE" on page 53 for setting the proper mode.

If the point selected is beyond the length of the longest enabled list, then the point will be set to the maximum possible point, and an error will be generated.

:LIST:MODE

Supported All Models

`[:SOURce]:LIST:MODE AUTO|MANual`

`[:SOURce]:LIST:MODE?`

This command sets the operating mode for the current list or step sweep.

AUTO This choice enables the selected sweep type to perform a sweep of all points.

MANual This choice enables you to select a single sweep point. The selected point controls the frequency and/or amplitude according to the sweep type. Refer to ":LIST:MANual" on page 52 for selecting a sweep point.

***RST** AUTO

Key Entry **Manual Mode Off On**

:LIST:POWer

Supported All Models

`[:SOURce]:LIST:POWer <val>{,<val>}`

`[:SOURce]:LIST:POWer?`

This command sets the amplitude for the current list sweep points.

Range Refer to "[:LEVel][:IMMediate][:AMPLitude]" on page 69 for output power ranges.

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

During an amplitude sweep operation, signal generators with Option UNB or Option 506 protect the step attenuator by automatically switching to attenuator hold (OFF) mode. The attenuator is locked at its current setting and the amplitude sweep range is limited to 40 dB.

The maximum number of list sweep points is 1,601.

:LIST:POWer:POINts

Supported All Models

`[:SOURce]:LIST:POWer:POINts?`

This command queries the number of power points in the current list sweep file.

:LIST:RETRace

Supported All Models

```
[:SOURce]:LIST:RETRace ON|OFF|1|0
[:SOURce]:LIST:RETRace?
```

This command resets the single sweep to the first sweep point, or leaves it at the last sweep point upon completion of the sweep operation.

On (1)	The sweep resets to the first sweep point.
Off (0)	The sweep stays at the last sweep point.
***RST**	1
Key Entry	**Sweep Retrace Off On**

:LIST:TRIGger:SOURce

Supported All Models

```
[:SOURce]:LIST:TRIGger:SOURce BUS|IMMediate|EXTernal|KEY
[:SOURce]:LIST:TRIGger:SOURce?
```

This command sets the trigger source for a list or step sweep event.

To set the sweep trigger, see ":TRIGger[:SEQuence]:SOURce" on page 168.

BUS	This choice enables GPIB triggering using the `*TRG` or `GET` command, or LAN and RS-232 triggering using the `*TRG` command.
IMMediate	This choice enables immediate triggering of the sweep event.
EXTernal	This choice enables the triggering of a sweep event by an externally applied signal at the TRIGGER IN connector.
KEY	This choice enables triggering by pressing the front-panel **Trigger** hardkey.

Example

```
:LIST:TRIG:SOUR BUS
```

The preceding example sets the trigger source to the instrument BUS.

***RST**	IMM
Key Entry	**Bus** **Free Run** **Ext** **Trigger Key**

:LIST:TYPE

Supported All Models

```
[:SOURce]:LIST:TYPE LIST|STEP
[:SOURce]:LIST:TYPE?
```

This command toggles between the two types of sweep.

LIST This type of sweep has arbitrary frequencies and amplitudes.

STEP This type of sweep has equally spaced frequencies and amplitudes.

***RST** STEP

Key Entry **Sweep Type List Step**

:LIST:TYPE:LIST:INITialize:FSTep

Supported All Models

CAUTION The current list sweep data will be overwritten once this command is executed. If needed, save the current data. Refer to ":STORe:LIST" on page 123 for storing list sweep files.

```
[:SOURce]:LIST:TYPE:LIST:INITialize:FSTep
```

This command replaces the loaded list sweep data with the settings from the current step sweep data points.

Key Entry **Load List From Step Sweep**

Remarks You can have only one sweep list at a time.

The maximum number of list sweep points is 1,601. When copying the step sweep settings over to a list sweep, ensure that the number of points in the step sweep do not exceed the maximum list sweep points.

:LIST:TYPE:LIST:INITialize:PRESet

Supported All Models

CAUTION The current list sweep data will be overwritten once this command is executed. If needed, save the current data. Refer to ":STORe:LIST" on page 123 for storing list sweep files.

```
[:SOURce]:LIST:TYPE:LIST:INITialize:PRESet
```

This command replaces the current list sweep data with a factory-defined file consisting of one point at a frequency, amplitude, and dwell time.

Key Entry **Preset List**

:SWEep:DWELl

Supported All Models

```
[:SOURce]:SWEep:DWELl <val>
[:SOURce]:SWEep:DWELl?
```

This command enables you to set the dwell time for a step sweep.

The variable <val> is expressed in units of seconds with a 0.001 resolution.

NOTE The dwell time (<val>) does not begin until the signal generator has settled for the current frequency and/or amplitude change.

***RST**	+2.00000000E–003
Range	0.001–60
Key Entry	**Step Dwell**
Remarks	Dwell time is used when the trigger source is set to `IMMediate.` Refer to ":LIST:TRIGger:SOURce" on page 54 for the trigger setting. The dwell time is the amount of time the sweep is guaranteed to pause after setting the frequency and/or power for the current point.

:SWEep:POINts

Supported All Models

`[:SOURce]:SWEep:POINts <val>`
`[:SOURce]:SWEep:POINts?`

This command defines the number of step sweep points.

***RST**	2
Range	2–65535
Key Entry	**# Points**

Power Subsystem ([:SOURce]:POWer)

:ALC:BANDwidth|BWIDth

Supported All Models

```
[:SOURce]:POWer:ALC:BANDwidth|BWIDth 100HZ|1KHZ|10KHZ
[:SOURce]:POWer:ALC:BANDwidth|BWIDth?
```

This command sets the bandwidth of the automatic leveling control (ALC) loop. This is one of two commands that replace the `:DM:EXTernal:ALC:BANDwidth|BWIDth NORMal|NARRow` command. The `NARRow` parameter in the old command corresponds to the `100HZ` selection. The `NORMal` parameter in the old command corresponds to the `ON` parameter in the command ":ALC:BANDwidth" on page 59.

100HZ	This choice selects a 100 Hz ALC bandwidth. This bandwidth has the longest settling time, but the least signal degradation and lowest error vector magnitude for digital signals. This is the auto selection for digital modulation.
1KHZ	This choice selects a 1 kHz ALC bandwidth. This bandwidth is the auto selection for pulse modulation and AM modulation to a carrier frequency of 500 kHz.
10KHZ	This choice selects a 10 kHz ALC bandwidth. This bandwidth has the fastest settling time, but the most signal degradation and highest error vector magnitude for digital signals. This is the auto selection for AM modulation above a 500 kHz carrier frequency and with FM/ΦM modulation.

Example

```
:POW:ALC:BWID 1KHZ
```

The preceding example sets the ALC bandwidth to 1 kHz.

***RST** 10000

Key Entry **100 Hz** **1kHz** **10 kHz**

Remarks Use this command when the ALC is set to on. Refer to ":ALC[:STATe]" on page 62 for selecting the ALC on or off state. Refer to the *E4428C/38C ESG Signal Generators User's Guide* for information on ALC bandwidth.

:ALC:BANDwidth

Supported All Models

```
[:SOURce]:POWer:ALC:BANDwidth|BWIDth:AUTO ON|OFF|1|0
[:SOURce]:POWer:ALC:BANDwidth|BWIDth:AUTO?
```

This command turns the bandwidth (BW) auto state on or off.

The bandwidth auto function allows the signal generator to automatically select a bandwidth for the automatic leveling control (ALC) circuit. This is one of two commands that replace the `:DM:EXTernal:ALC:BANDwidth|BWIDth NORMal|NARRow` command. The `ON` (1) selection in this command corresponds to the `NORMal` parameter in the old command. The `NARRow` parameter in the old command corresponds to the `100HZ` parameter used with the command ":ALC:BANDwidth|BWIDth" on page 58.

ON (1) This choice allows the signal generator to automatically select an ALC BW. The selection of the ALC BW depends on the signal generator modulation type as shown in the following table.

Modulation Type	Auto ALC Bandwidth Selection
Digital Modulation	100 Hz
Pulse Modulation	1 kHz
AM Modulation	10 kHz[1] or 1 kHz
FM/ΦM Modulation	10 kHz

1. 10 kHz ALC bandwidth for carrier frequencies above 500 kHz

OFF (0) This choice disables automatic selection of the ALC BW, allowing you to select one of three ALC BWs: 100 Hz, 1 kHz, or 10 kHz. To select the desired ALC bandwidth, use the ":ALC:BANDwidth|BWIDth"command shown on page 58.

***RST** 1

Key Entry **Auto**

Remarks For more information on ALC bandwidth, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:ALC:LEVel

Supported All Models

`[:SOURce]:POWer:ALC:LEVel <value>dB`
`[:SOURce]:POWer:ALC:LEVel?`

This command sets the automatic leveling control (ALC) level. Use this command after setting the attenuation auto mode to On. Refer to “:ATTenuation:AUTO” on page 65 for setting the attenuation auto mode.

The ALC is used to maintain the signal generator’s output power level by compensating for power fluctuations due to drift, band changes, or load variations. After you set the ALC level, the signal generator’s output power is monitored and corrected so that the power level setting is maintained.

Example

```
:POW:ALC:LEV 10DB
```

The preceding example sets the ALC to 10 dB.

***RST** +1.00000000E+000

Range -20 to 20

Key Entry **Set ALC Level**

:ALC:SEARch

Supported All Models

`[:SOURce]:POWer:ALC:SEARch ON|OFF|1|0|ONCE`
`[:SOURce]:POWer:ALC:SEARch?`

This command sets the internal power search mode. A power search is recommended for pulse-modulated signals with pulse widths less than one microsecond.

ON (1) This choice executes the power search automatically with each change in RF frequency or power.

OFF (0) This choice disables the automatic power search routine.

ONCE This choice executes a single power search of the current RF output signal.

***RST** 0

Key Entry **Power Search Manual Auto** **Do Power Search**

Remarks Use this command when the ALC state is set to OFF (0). Refer to “:ALC[:STATe]” on page 62 for setting the ALC state.

If ON was previously selected, executing ONCE will cause OFF to be the current selection after the power search is completed.

:ALC:SEARch:REFerence

Supported All Models

```
[:SOURce]:POWer:ALC:SEARch:REFerence FIXed|MODulated
[:SOURce]:POWer:ALC:SEARch:REFerence?
```

This command sets either fixed or modulated modes of power search.

FIXed This choice uses a 0.5 volt reference.

MODulated This choice uses the RMS value of the current I/Q modulation.

***RST** MOD

Key Entry **Power Search Reference Fixed Mod**

:ALC:SEARch:SPAN:START

Supported All Models

```
[:SOURce]:POWer:ALC:SEARch:SPAN:START
[:SOURce]:POWer:ALC:SEARch:SPAN:START?
```

This command sets the start frequency for a span power search over a user specified range.

Key Entry **Start Frequency**

Remarks The start frequency has no default value. The start frequency value will be the last value set before powering off the instrument.

:ALC:SEARch:SPAN:STOP:SPAN:STOP

Supported All Models

```
[:SOURce]:POWer:ALC:SEARch:SPAN:STOP
[:SOURce]:POWer:ALC:SEARch:SPAN:STOP?
```

This command sets the stop frequency for a span power search over a user specified range.

Key Entry **Stop Frequency**

Remarks The stop frequency has no default value. The stop frequency value will be the last value set before powering off the instrument.

:ALC:SEARch:SPAN:TYPE

Supported All Models

```
[:SOURce]:POWer:ALC:SEARch:SPAN:TYPE FULL|USER
[:SOURce]:POWer:ALC:SEARch:SPAN:TYPE?
```

This command enables you to select the frequency range for a span power search. You can specify the range (`USER`) or you can select the full range (`FULL`) of the signal generator.

Key Entry **Span Type User Full**

:ALC:SEARch:SPAN[:STATe]

Supported All Models

```
[:SOURce]:POWer:ALC:SEARch:SPAN[:STATe] ON|OFF|1|0
[:SOURce]:POWer:ALC:SEARch:SPAN[:STATe]?
```

This command enables (1) or disables (0) the span mode, allowing you to perform power searches over a selected range of frequencies. The power search corrections are then stored and used whenever the signal generator is tuned within the selected range.

:ALC[:STATe]

Supported All Models

```
[:SOURce]:POWer:ALC[:STATe] ON|OFF|1|0
[:SOURce]:POWer:ALC[:STATe]?
```

This command enables or disables the automatic leveling control (ALC) circuit.

***RST** 1

Key Entry **ALC Off On**

Remarks The purpose of the ALC circuit is to hold output power at a desired level by adjusting the signal generator's power circuits to compensate for power drift. Power drift occurs over time and changes in temperature. Refer to the *E4428C/38C ESG Signal Generators User's Guide* for more information on the ALC.

:ALTernate:AMPLitude

Supported All Models except signal generators with Option UNB or 506.

```
[:SOURce]:POWer:ALTernate:AMPLitude <val>
[:SOURce]:POWer:ALTernate:AMPLitude?
```

This command sets the delta value for the alternate amplitude.

The variable <val> is expressed in units of decibels (dB).

***RST**	+0.00000000E+000
Range	–156 to 156
Key Entry	**Alt Amp Delta**
Remarks	The actual RF output amplitude is equal to the Alternate Amplitude Delta value plus the RF output amplitude; this sum cannot exceed the minimum and maximum amplitude limits of the signal generator. For example, if the Alternate Amplitude Delta is set to –156 dB and the RF output amplitude is set to 20 dB, the sum is equal to –136 dB.

:ALTernate:MANual

Supported All Models

```
[:SOURce]:POWer:ALTernal:MANual MAIN|DELTa
[:SOURce]:POWer:ALTernal:MANual?
```

This command toggles the alternate amplitude manual trigger source between main and alternate (delta).

MAIN	The main power is present at the RF output.
DELTa	The alternate power is present at the RF output.
***RST**	MAIN
Key Entry	**Manual Trigger Main Delta**
Remarks	This command is effective only if MANual is the selection for the trigger source. Refer to “:ALTernate:TRIGger[:SOURce]” on page 64 for more information.

:ALTernate:STATe

Supported All Models

```
[:SOURce]:POWer:ALTernate:STATe ON|OFF|1|0
[:SOURce]:POWer:ALTernate:STATe?
```

This command enables or disables the alternate amplitude.

***RST** 0

Key Entry **Alt Ampl Off On**

:ALTernate:TRIGger[:SOURce]

Supported All Models except with Option UNB or 506

```
[:SOURce]:POWer:ALTernate:TRIGger[:SOURce] INTernal|EXTernal|MANual
[:SOURce]:POWer:ALTernate:TRIGger[:SOURce]?
```

This command sets the trigger source for the alternate amplitude signal.

INTernal This choice is available only for an E4438C with Option 001/601 or 002/602. The baseband generator triggers each timeslot to output a power level set with either the user-selected main or alternate amplitude parameter.

Each timeslot is allowed to output power with a user-selected main or alternate amplitude. This choice requires the Option 001/601or 002/602 baseband generator option.

This choice requires a baseband generator option. Each timeslot is allowed to output power with a user-selected main or alternate amplitude.

EXTernal This choice requires an external trigger to the TRIG IN rear panel connector to toggle the RF output power between main and alternate amplitudes.

MANual This choice enables the RF output power to be toggled between main and alternate amplitudes using the front-panel **Trigger** hardkey.

***RST** MAN

Key Entry **Int** **Ext** **Manual**

:ATTenuation

Supported All Models

```
[:SOURce]:POWer:ATTenuation <val><unit>
[:SOURce]:POWer:ATTenuation?
```

This command sets the signal generator's attenuator level. Before setting the attenuator level, set the ":ATTenuation:AUTO" function to Off which will disable ALC control.

In normal operation the attenuator level is selected by the signal generator's automatic loop control (ALC) which maintains the output power by adjusting internal circuits to compensate for any power fluctuations due to drift, band changes, or load variations. In some applications, such as fast pulse modulation, the ALC may not respond quickly enough to compensate for the pulse rise times. In this case you can set the attenuator and override any ALC adjustments.

The output power is the ALC level minus the attenuator setting. The attenuator is set in increments of 5 dB.

Example

```
:POW:ATT 10DB
```

The preceding example sets the attenuator to 10 dB.

***RST** +115

Range 0 to 115 dB

Key Entry **Set Atten**

:ATTenuation:AUTO

Supported All Models

```
[:SOURce]:POWer:ATTenuation:AUTO ON|OFF|1|0
[:SOURce]:POWer:ATTenuation:AUTO?
```

This command sets the state of the attenuator auto mode function.

ON (1) This selection allows the signal generator's automatic loop control (ALC) to adjust the attenuator so that a specified RF power level, at the ESG's RF output connector, is maintained.

OFF (0) This choice allows for a user-selected attenuator setting that is not affected by the signal generator's ALC circuitry.

The OFF (0) selection can be used to eliminate power discontinuity normally associated with attenuator switching during power adjustments.

***RST** 1

Key Entry **Atten Hold Off On**

Remarks During an amplitude sweep operation, signal generators with Option UNB or 506 protect the step attenuator from fast amplitude changes by automatically switching to attenuator auto Off mode. The attenuator is locked at its current setting and the amplitude sweep range is limited to 40 dB. Refer to the ":ALC:LEVel" on page 60 for more information.

:MODE

Supported All Models

```
[:SOURce]:POWer:MODE FIXed|LIST
[:SOURce]:POWer:MODE?
```

This command sets the signal generator power mode to fixed or swept.

FIXed This choice stops a power sweep, allowing the signal generator to operate at a fixed power level. Refer to "[:LEVel][:IMMediate][:AMPLitude]" on page 69 for setting the output power level.

LIST This choice selects the swept power mode. If sweep triggering is set to immediate along with continuous sweep mode, executing the command starts the LIST or STEP power sweep.

NOTE To perform a frequency and amplitude sweep, you must also select LIST as the frequency mode. See ":FREQuency:MODE" on page 42 for selecting the list mode for a frequency sweep.

***RST** FIX

Key Entry **Amplitude** **Ampl** **Off**

:REFerence

Supported All Models

```
[:SOURce]:POWer:REFerence <val><unit>
[:SOURce]:POWer:REFerence?
```

This command sets the power level for the signal generator RF output reference.

***RST** +0.00000000E+000

Range -400 to 300DBM

Key Entry **Ampl Ref Set**

Remarks The RF output power is referenced to the value entered in this command.

:REFerence:STATe

Supported All Models

```
[:SOURce]:POWer:REFerence:STATe ON|OFF|1|0
[:SOURce]:POWer:REFerence:STATe?
```

This command enables or disables the RF output reference.

ON(1) This choice will set the power reference state to ON. The unit displayed for commands, “:ANNotation:AMPLitude:UNIT” on page 85 and “:POWer” on page 170 will be expressed in DB.

OFF(0) This choice will set the power reference state to OFF.

***RST** 0

Key Entry **Ampl Ref Off On**

Remarks Once the reference state is ON, all subsequent output power settings are set relative to the reference value.

Amplitude offsets can be used with the amplitude reference mode.

:STARt

Supported All Models

```
[:SOURce]:POWer:STARt <val><unit>
[:SOURce]:POWer:STARt?
```

This command sets the first amplitude point in a step sweep.

***RST** −1.35000000E+002

Range Refer to “[:LEVel][:IMMediate][:AMPLitude]” on page 69 for the output power ranges.

Key Entry **Ampl Start**

Remarks During an amplitude sweep operation, signal generators with Option UNB or 506 protect the step attenuator by automatically switching to attenuator hold (ON) mode. The attenuator is locked at its current setting and the amplitude sweep range is limited to 40 dB.

:STOP

Supported All Models

```
[:SOURce]:POWer:STOP <val><unit>
[:SOURce]:POWer:STOP?
```

This command sets the last amplitude point in a step sweep.

***RST** –1.35000000E+002

Range Refer to "[:LEVel][:IMMediate][:AMPLitude]" on page 69 for the output power ranges.

Key Entry **Ampl Stop**

Remarks During an amplitude sweep operation, signal generators with Option UNB or 506 protect the step attenuator by automatically switching to attenuator hold (ON) mode. The attenuator is locked at its current setting and the amplitude sweep range is limited to 40 dB.

[:LEVel][:IMMediate]:OFFSet

Supported All Models

```
[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet <val><unit>
[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet?
```

This command sets the power offset value.

***RST** +0.00000000E+000

Range –200DB to 200DB

Key Entry **Ampl Offset**

Remarks This simulates a power level at a test point beyond the RF OUTPUT connector without changing the actual RF output power. The offset value only affects the displayed amplitude setting.

You can enter an amplitude offset any time in either normal operation or amplitude reference mode.

[:LEVel][:IMMediate][:AMPLitude]

Supported All Models

```
[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude] <val><unit>
[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude]?
```

This command sets the RF output power.

***RST** –1.35000000E+002

Range

Frequency	*Standard*	*Option UNB*	*Option 506*
250kHZ–250MHZ	–136 to 11DBM	–136 to 15DBM	–136 to 12DBM
>250MHZ–1GHZ	–136 to 13DBM	–136 to 17DBM	–136 to 14DBM
> 1–3GHZ	–136 to 10DBM	–136 to 16DBM	–136 to 13DBM
> 3–4GHZ	–136 to 7DBM	–136 to 13DBM	–136 to 10DBM
> 4–6GHZ	N/A	N/A	–136 to 10DBM

Key Entry **Amplitude**

Remarks The ranges for this command are specified values from the data sheet.

[:LEVel][:IMMediate][:AMPLitude]:STEP

Supported All Models

```
[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude]:STEP[:INCRement]
<val><unit>|UP|DOWN
[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude]:STEP[:INCRement]?
```

This command sets the incremental step value for the amplitude parameter, or increments or decrements the current RF output power level by the specified `<val>` value.

`<val>` The increment power value.

`UP` Increases the current output power by the amount set with `<val>`. The front-panel up arrow key performs the same function.

`DOWN` Decreases the current output power by the amount set with `<val>`. The front-panel down arrow key performs the same function.

Range .02–100dB

Key Entry **Incr Set**

Remarks The value set with this command is not affected by *RST or a power cycle.

3 System Commands

This chapter provides SCPI descriptions for subsystems dedicated to peripheral signal generator operations common to all ESG models. This chapter contains the following major sections:

Calibration Subsystem (:CALibration)

:DCFM

Supported All

`:CALibration:DCFM`

This command initiates a DCFM or DCΦM calibration depending on the currently active modulation. This calibration eliminates any dc or modulation offset of the carrier signal.

NOTE If the calibration is performed with a dc signal applied, any deviation provided by the dc signal will be removed and the new zero reference point will be at the applied dc level. The calibration will have to be performed again when the dc signal is disconnected to reset the carrier signal to the correct zero reference.

Key Entry **DCFM/DCFM Cal**

Remarks Use this calibration for externally applied signals. While the calibration can also be performed for internally generated signals, dc offset is not a normal characteristic for them.

:IQ

Supported E4438C

`:CALibration:IQ`

This command initiates an I/Q calibration.

Key Entry **Execute Cal**

:IQ:DC

Supported E4438C

`:CALibration:IQ:DC`

This command performs a one to two second adjustment that is not traceable to a standard. However, it will minimize errors associated with offset voltages. This adjustment minimizes errors for the current signal generator setting and at a single frequency. The DC adjustment is volatile and must be repeated with each signal generator setting change. This command can be sent while the RF On/Off is set to Off and the adjustment will still be valid when the RF is enabled.

The I/Q DC adjustment is dependent upon a number of instrument settings. If any of the instrument settings change, the adjustment will become invalid. The dependent instrument settings are:

- RF frequency
- I/Q attenuation level
- Baseband generator settings
- I/Q polarity settings
- Baseband filter settings
- Path settings (Internal I/Q Mux Path 1 or Path 2)
- I/Q calibration (the I/Q DC calibration will be invalidated if any other I/Q calibration is executed or if the **Revert to Factory Default** key is pressed)
- Temperature (±5 degrees)

The following instrument states will not invalidate the I/Q DC calibration:

- Power level changes
- I/Q Impairments

Key Entry **Execute Cal** (with **Calibration Type User Full** set to DC)

:IQ:DEFault

Supported E4438C

```
:CALibration:IQ:DEFault
```

This command will restore the original factory calibration data for the internal I/Q modulator.

Key Entry **Revert to Default Cal Settings**

:IQ:FULL

Supported E4438C

```
:CALibration:IQ:FULL
```

This command performs an adjustment to the I/Q offset, gain and quadrature for the full-frequency range (regardless of the start and stop frequency settings) and stores the results in the signal generator’s firmware.

Key Entry **Execute Cal** (with **Calibration Type User Full** set to Full)

Remarks Start and stop frequencies will default to the full frequency range of the signal generator.

:IQ:STARt

Supported E4438C

```
:CALibration:IQ:STARt <val><unit>
:CALibration:IQ:STARt?
```

This command sets the start frequency and automatically sets the calibration type to User for an I/Q calibration.

Range Option 501: 100kHZ–1GHZ

Option 502: 100kHZ–2GHZ

Option 503: 100kHZ–3GHZ

Option 504: 100kHZ–4GHZ

Option 506: 100kHZ–6GHZ

Key Entry **Start Frequency**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

:IQ:STOP

Supported E4438C

```
:CALibration:IQ:STOP <val><unit>
:CALibration:IQ:STOP?
```

This command sets the stop frequency and automatically sets the calibration type to User for an I/Q calibration.

Range Option 501: 100kHZ–1GHZ

Option 502: 100kHZ–2GHZ

Option 503: 100kHZ–3GHZ

Option 504: 100kHZ–4GHZ

Option 506: 100kHZ–6GHZ

Key Entry **Stop Frequency**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

Communication Subsystem (:SYSTem:COMMunicate)

:GPIB:ADDRess

Supported All

```
:SYSTem:COMMunicate:GPIB:ADDRess <number>
:SYSTem:COMMunicate:GPIB:ADDRess?
```

This command sets the signal generator's GPIB address.

Range 0–30

Key Entry **GPIB Address**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:GTLocal

Supported All

```
:SYSTem:COMMunicate:GTLocal
```

This command sets the signal generator to local mode which enables front panel operation.

Key Entry **Local**

:LAN:CONFig

Supported All Models

```
:SYSTem:COMMunicate:LAN:CONFig DHCP|MANual
:SYSTem:COMMunicate:LAN:CONFig?
```

This command sets the signal generator's internet protocol (IP) address.

`MANual` The user assigns an IP address to the signal generator.

`DHCP` The network assigns an IP address to the signal generator.

Example

```
:SYST:COMM:LAN:CONF DHCP
```

The preceding example sets up the signal generator LAN configuration to use a DHCP IP address.

Key Entry **LAN Config**

:LAN:GATEway

Supported All

```
:SYSTem:COMMunicate:LAN:GATEway "<ipstring>"
:SYSTem:COMMunicate:LAN:GATEway?
```

This command sets the gateway for local area network (LAN) access to the signal generator from outside the current sub-network.

Key Entry **Default Gateway**

Remarks Using an empty string restricts access to the signal generator to local hosts on the LAN.

:LAN:HOSTname

Supported All

```
:SYSTem:COMMunicate:LAN:HOSTname "<string>"
:SYSTem:COMMunicate:LAN:HOSTname?
```

This command sets the signal generator's local area network (LAN) connection hostname.

Key Entry **Hostname**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

:LAN:IP

Supported All

```
:SYSTem:COMMunicate:LAN:IP "<ipstring>"
:SYSTem:COMMunicate:LAN:IP?
```

This command sets the signal generator's local area network (LAN) internet protocol (IP) address for your IP network connection.

Key Entry **IP Address**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

:LAN:SUBNet

Supported All

`:SYSTem:COMMunicate:LAN:SUBNet "<ipstring>"`

`:SYSTem:COMMunicate:LAN:SUBNet?`

This command sets the signal generator’s local area network (LAN) subnet mask address for your internet protocol (IP) network connection.

Key Entry **Subnet Mask**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

:PMETer:ADDRess

Supported All

`:SYSTem:COMMunicate:PMETer:ADDRess <val>`

`:SYSTem:COMMunicate:PMETer:ADDRess?`

This command sets the address for a power meter that is controlled by the signal generator.

Range 0–30

Key Entry **Meter Address**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

The power meter is controlled only through a GPIB cable.

Ensure that the power meter address is different from the signal generator address.

:PMETer:CHANnel

Supported All

`:SYSTem:COMMunicate:PMETer:CHANnel A|B`

`:SYSTem:COMMunicate:PMETer:CHANnel?`

This command sets the measurement channel on the power meter that is controlled by the signal generator.

Key Entry **Meter Channel A B**

Remarks A single-channel power meter uses channel A and selecting channel B will have no effect.

The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

The power meter is controlled only through a GPIB cable.

:PMETer:IDN

Supported All

```
:SYSTem:COMMunicate:PMETer:IDN E4418B|E4419B|E4416A|E4417A
:SYSTem:COMMunicate:PMETer:IDN?
```

This command sets the model number of the power meter that is controlled by the signal generator.

Key Entry **Power Meter**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

The power meter is controlled only through a GPIB cable.

:PMETer:TIMEout

Supported All

```
:SYSTem:COMMunicate:PMETer:TIMEout <num>[<time suffix>]
:SYSTem:COMMunicate:PMETer:TIMEout?
```

This command sets the period of time which the signal generator will wait for a valid reading from the power meter.

The variable <num> has a resolution of 0.001.

Range 1mS–100S

Key Entry **Meter Timeout**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

The power meter is controlled only through a GPIB cable.

If a time-out occurs, the signal generator reports an error message.

:SERial:BAUD

Supported All

`:SYSTem:COMMunicate:SERial:BAUD <number>`

`:SYSTem:COMMunicate:SERial:BAUD?`

This command sets the baud rate for the rear panel RS-232 interface labeled RS-232.

Key Entry **RS-232 Baud Rate**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

:SERial:ECHO

Supported All

`:SYSTem:COMMunicate:SERial:ECHO ON|OFF`

`:SYSTem:COMMunicate:SERial:ECHO?`

This command enables or disables the RS-232 echo.

Key Entry **RS-232 ECHO Off On**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

:SERial:RESet

Supported All

`:SYSTem:COMMunicate:SERial:RESet`

This event command resets the RS-232 buffer and will discard any unprocessed SCPI input received by the RS-232 port.

Key Entry **Reset RS-232**

:SERial:TOUT

Supported All

`:SYSTem:COMMunicate:SERial:TOUT <val>`

`:SYSTem:COMMunicate:SERial:TOUT?`

This command sets the RS-232 serial port time-out value.

If further input is not received within the time-out period specified, while a SCPI command is being processed, the command is aborted and the input buffer is cleared.

The variable <val> is entered in units of seconds.

Range 1–25

Key Entry **RS-232 Timeout**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

Diagnostic Subsystem (:DIAGnostic[:CPU]:INFOrmation)

:BOARds

Supported All

`:DIAGnostic[:CPU]:INFOrmation:BOARds?`

This query returns a list of the installed boards in the signal generator. The information will be returned in the following format:

`"<board name,part number,serial number,version number,status>"`

This information format will repeat with as many iterations as the number of detected boards in the signal generator.

Key Entry **Installed Board Info**

:CCOunt:ATTenuator

Supported All

`:DIAGnostic[:CPU]:INFOrmation:CCOunt:ATTenuator?`

This query returns the cumulative number of times that the attenuator has been switched.

Key Entry **Diagnostic Info**

:CCOunt:PON

Supported All

`:DIAGnostic[:CPU]:INFOrmation:CCOunt:PON?`

This query returns the cumulative number of times the signal generator has been powered-on.

Key Entry **Diagnostic Info**

:CCOunt:PROTection

Supported All

`:DIAGnostic[:CPU]:INFOrmation:CCOunt:PROTection?`

This query returns the cumulative number of times the reverse power protection has been cycled.

Key Entry **Diagnostic Info**

:DISPlay:OTIMe

Supported All Models

`:DIAGnostic[:CPU]:INFOrmation:DISPlay:OTIMe?`

This query returns the cumulative number of hours the display has been on.

Key Entry **Diagnostic Info**

:LICense:AUXiliary

Supported E4438C with Option 001/600 or 002.602

`:DIAGnostic[:CPU]:INFOrmation:LICense:AUXiliary?`

This query returns a list of licenses for software applications associated with the signal generator that have the software license file installed on the PC, as opposed to a license key installed on the signal generator. However this query does not return demo licenses for Arb-based applications.

Key Entry **Auxiliary Software Options**

Remarks If you use the signal generator with a PC that has a copy of a software application for which a license shows with this query, the software automatically accesses and installs the license on the PC.

To access Arb-based demo software licenses, see ":LICense:WAVeform" . To view option numbers for software applications that use license keys, see ":OPTions" on page 83.

:LICense:WAVeform

Supported E4438C with Option 001/600 or 002/602

`:DIAGnostic[:CPU]:INFOrmation:LICense:WAVeform?`

This query returns a list of Arb-based licenses (including demo) for software applications associated with the signal generator that have the software license file installed on the PC, as opposed to a license key installed on the signal generator. These waveform licenses are created by the software application in a license file on the PC. Refer to ":WLICence[:VALue]" on page 84 for more information.

The response format is a series of comma-separated entries enclosed in quotation marks. The first field is the waveform type number and the second is a text description of the license.

Key Entry **Waveform Licenses**

Remarks If a license appears in this list, this means that you can transfer waveform files, created with the associated Arb-based software application to another signal generator if the other signal generator has the same license. For more information, refer to the command, ":LICense:AUXiliary" on page 82.

For a list of option numbers for software applications that use license keys, see ":OPTions".

:OPTions

Supported All Models

`:DIAGnostic[:CPU]:INFOrmation:OPTions?`

This query returns a list of internally installed signal generator options.

Key Entry **Options Info**

:OPTions:DETail

Supported All Models

`:DIAGnostic[:CPU]:INFOrmation:OPTions:DETail?`

This query returns the options that are installed along with the option revision and DSP version if applicable.

Key Entry **Options Info**

:OTIMe

Supported All Models

`:DIAGnostic[:CPU]:INFOrmation:OTIMe?`

This query returns the cumulative number of hours that the signal generator has been on.

Key Entry **Diagnostic Info**

:REVision

Supported All Models

`:DIAGnostic[:CPU]:INFOrmation:REVision?`

This query returns the CPU bootstrap read only memory (boot ROM) revision date. In addition, the query returns the revision, creation date, and creation time of the main firmware.

Key Entry **Diagnostic Info**

:SDATe

Supported All Models

`:DIAGnostic[:CPU]:INFOrmation:SDATe?`

This query returns the date and time of the main firmware.

Key Entry **Diagnostic Info**

:WLICence[:VALue]

Supported E4438C with Option 001/601 or 002/602

`:DIAGnostic[:CPU]:INFOrmation:WLICense[:VALue]? <type_num>`

This query returns the number of seconds remaining on the waveform license for the type of waveform designated by the `<type_num>` variable number. The type variable number is obtained using the “:LICense:WAVeform” command shown on page 82. Zero is returned for non-existent and expired licenses. The value 2^32 -1 (4,294,967,295) is returned for licenses that do not expire. Refer to the *E4428C/38C ESG Signal Generators Key and Data Field Reference* for information on the waveform licence.

Display Subsystem (:DISPlay)

:ANNotation:AMPLitude:UNIT

Supported All Models

```
:DISPlay:ANNotation:AMPLitude:UNIT DBM|DBUV|DBUVEMF|V|VEMF|DB
:DISPlay:ANNotation:AMPLitude:UNIT?
```

This command sets the displayed front panel amplitude units.

If the amplitude reference state is set to on, the query returns units expressed in DB. Setting any other unit will cause a setting conflict error stating that the amplitude reference state must be set to off. Refer to, “:REFerence:STATe” on page 67 for more information.

***RST** DBM

:ANNotation:CLOCk:DATE:FORMat

Supported All Models

```
:DISPlay:ANNotation:CLOCk:DATE:FORMat MDY|DMY
:DISPlay:ANNotation:CLOCk:DATE:FORMat?
```

This command enables the selection of the date format. The choices are month-day-year (MDY) or day-month-year (DMY) format.

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:ANNotation:CLOCk[:STATe]

Supported All Models

```
:DISPlay:ANNotation:CLOCk[:STATe] ON|OFF|1|0
:DISPlay:ANNotation:CLOCk[:STATe]?
```

This command enables or disables the digital clock view in the lower right side of the front panel display.

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:BRIGhtness

Supported All Models

```
:DISPlay:BRIGhtness <val>
:DISPlay:BRIGhtness?
```

This command sets the display brightness (intensity). The brightness can be set to the minimum level (0.02), maximum level (1), or in between by using fractional numeric values (0.03–0.99).

Range 0.02–1

Key Entry **Brightness**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

:CAPTure

Supported All Models

```
:DISPlay:CAPTure
```

This event command enables the user to capture the current display and store it in the signal generator’s memory.

Remarks The display capture is stored as DISPLAY.BMP in the Binary file system. This file is overwritten with each subsequent display capture. The file can be down-loaded in the following manner:

1. Log on to the signal generator using ftp.
2. Change (cd) to the BIN directory.
3. Retrieve the file by using the get command.

:CONTrast

Supported All Models

```
:DISPlay:CONTrast <val>
:DISPlay:CONTrast?
```

This command sets the contrast of the LCD display. The contrast can be set to the maximum level (1), minimum level (0), or in between by using fractional numeric values (0.001–0.999).

Range 0–1

Key Entry Display contrast hardkeys are located below the display.

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:INVerse

Supported All Models

```
:DISPlay:INVerse ON|OFF|1|0
:DISPlay:INVerse?
```

This command sets the display of the source to inverse video mode.

Key Entry **Inverse Video Off On**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:REMote

Supported All Models

```
:DISPlay:REMote ON|OFF|1|0
:DISPlay:REMote?
```

This command enables or disables the display updating when the signal generator is remotely controlled.

ON (1) This choice updates the signal generator display so you can see the settings as the commands are executed, however, this will degrade the signal generator speed.

OFF (0) This choice turns off the display updating while further optimizing the signal generator for speed.

Key Entry **Update in Remote Off On**

Remarks The setting enabled by this command is not affected by signal generator preset or *RST. However, cycling the signal generator power will reset it to zero.

[:WINDow][:STATe]

Supported All Models

```
:DISPlay[:WINDow][:STATe] ON|OFF|1|0
:DISPlay[:WINDow][:STATe]?
```

This command is used to either blank out (OFF or 0) the display screen or turn it on (ON or 1).

Remarks The setting enabled by this command is not affected by *RST. However, presetting the signal generator or cycling the power will turn the display on.

IEEE 488.2 Common Commands

*CLS

Supported All Models

`*CLS`

The Clear Status (CLS) command clears the Status Byte Register, the Data Questionable Event Register, the Standard Event Status Register, the Standard Operation Status Register and any other registers that are summarized in the status byte.

*ESE

Supported All Models

`*ESE <data>`

The Standard Event Status Enable (ESE) command sets the Standard Event Status Enable Register.

The variable <data> represents the sum of the bits that will be enabled.

Range 0–255

Remarks The setting enabled by this command is not affected by signal generator preset or `*RST`. However, cycling the signal generator power will reset this register to zero.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

*ESE?

Supported All Models

`*ESE?`

The Standard Event Status Enable (ESE) query returns the value of the Standard Event Status Enable Register.

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

*ESR?

Supported All Models

CAUTION This is a destructive read. The data in the register is latched until it is queried. Once queried, the data is cleared.

```
*ESR?
```

The Standard Event Status Register (ESR) query returns the value of the Standard Event Status Register.

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

*IDN?

Supported All Models

```
*IDN?
```

The Identification (IDN) query outputs an identifying string. The response will show the following information:

```
<company name>, <model number>, <serial number>, <firmware revision>
```

Key Entry **Diagnostic Info**

Remarks The identification information can be modified. Refer to “:IDN” on page 156 for more information.

*OPC

Supported All Models

```
*OPC
```

The Operation Complete (OPC) command sets bit 0 in the Standard Event Status Register when all pending operations have finished.

*OPC?

Supported All Models

`*OPC?`

The Operation Complete (OPC) query returns the ASCII character 1 in the Standard Event Status Register when all pending operations have finished.

*OPT?

Supported All Models

`*OPT?`

The options (OPT) query returns a comma-separated list of all of the instrument options currently installed on the signal generator.

Key Entry **Instrument Options**

*PSC

Supported

`*PSC ON|OFF|1|0`

The Power-On Status Clear (PSC) command controls the automatic power-on clearing of the Service Request Enable Register, the Standard Event Status Enable Register, and device-specific event enable registers.

ON (1) This choice enables the power-on clearing of the listed registers.

OFF (0) This choice disables the clearing of the listed registers and they retain their status when a power-on condition occurs.

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

*PSC?

Supported All Models

`*PSC?`

The Power-On Status Clear (PSC) query returns the flag setting as enabled by the `*PSC` command.

*RCL

Supported All Models

`*RCL <reg>,<seq>`

The Recall (RCL) command recalls the state from the specified memory register <reg> of the specified sequence <seq>.

Range Registers: 0–99 Sequences: 0–9

Key Entry **RECALL Reg** **Select Seq:**

*RST

Supported All Models

`*RST`

The Reset (RST) command resets most signal generator functions to factory-defined conditions.

Remarks Each command shows the *RST value if the setting is affected.

*SAV

Supported All Models

`*SAV <reg>,<seq>`

The Save (SAV) command saves signal generator settings to the specified memory register `<reg>` of the specified sequence `<seq>`.

Range *Registers*: 0–99 *Sequences*: 0–9

Key Entry **Save Reg** **Save Seq[n] Reg[nn]**

Remarks The save function does not save all signal generator settings. Refer to the *E4428C/38C ESG Signal Generators User's Guide* for more information on the save function. Refer to "*RCL" on page 90 for information on recalling saved signal generator settings.

*SRE

Supported All Models

`*SRE <data>`

The Service Request Enable (SRE) command sets the value of the Service Request Enable Register.

The variable `<data>` is the decimal sum of the bits that will be enabled. Bit 6 (value 64) is ignored and cannot be set by this command.

Range 0–255

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming*

Guide for more information.

Entering values from 64 to 127 is equivalent to entering values from 0 to 63.

The setting enabled by this command is not affected by signal generator preset or `*RST`. However, cycling the signal generator power will reset it to zero.

*SRE?

Supported All Models

`*SRE?`

The Service Request Enable (SRE) query returns the value of the Service Request Enable Register.

Range 0–63 or 128–191

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

*STB?

Supported All Models

`*STB?`

The Read Status Bye (STB) query returns the value of the status byte including the master summary status (MSS) bit.

Range 0–255

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

*TRG

Supported All Models

`*TRG`

The Trigger (TRG) command triggers the device if BUS is the selected trigger source, otherwise, *TRG is ignored.

*TST?

Supported All Models

`*TST?`

The Self-Test (TST) query initiates the internal self-test and returns one of the following results:

0	This shows that all tests passed.
1	This shows that one or more tests failed.
Key Entry	**Run Complete Self Test**

*WAI

Supported All Models

`*WAI`

The Wait-to-Continue (WAI) command causes the signal generator to wait until all pending commands are completed, before executing any other commands.

Memory Subsystem (:MEMory)

:CATalog:BINary

Supported E4438C with Option 001/601or 002/602

`:MEMory:CATalog:BINary?`

This command outputs a list of the binary files. The return data will be in the following form:

`<mem used>,<mem free>{,"<file listing>"}`

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

`"<file name,file type,file size>"`

Key Entry **Binary**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:CATalog:BIT

Supported E4438C with Option 001/601or 002/602

`:MEMory:CATalog:BIT?`

This command outputs a list of the bit files. The return data will be in the following form:

`<mem used>,<mem free>{,"<file listing>"}`

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

`"<file name,file type,file size>"`

Key Entry **Bit**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:CATalog:CDMa

NOTE Refer to the *E4428C/38C ESG Signal Generators Programming Compatibility Guide* for information on this command. This command is still valid for backward compatibility and was replaced by ":CATalog:CDMA" .

:CATalog:CDMA

Supported E4438C with Option 401

```
:MEMory:CATalog:CDMA?
```

This command outputs a list of the arbitrary waveform CDMA files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

"<file name,file type,file size>"

Key Entry **CDMA**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:CATalog:DMOD

Supported E4438C with Option 001/601or 002/602

```
:MEMory:CATalog:DMOD?
```

This command outputs a list of the arbitrary waveform digital modulation files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry **DMOD**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:CATalog:DWCDma

Supported E4438C with Option 400

```
:MEMory:CATalog:DWCDma?
```

This command outputs a list of the arbitrary waveform downlink W-CDMA files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry **DWCDMA**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:CATalog:FCDMa

Supported E4438C with Option 401

```
:MEMory:CATalog:FCDMa?
```

This command outputs a list of the arbitrary waveform forward link cdma2000 files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry **FCDMA**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:CATalog:FIR

Supported E4438C with Option 001/601or 002/602

`:MEMory:CATalog:FIR?`

This command outputs a list of the finite impulse response filter files. The return data will be in the following form:

`<mem used>,<mem free>{,"<file listing>"}`

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

`"<file name,file type,file size>"`

Key Entry **FIR**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:CATalog:FSK

Supported E4438C with Option 001/601or 002/602

`:MEMory:CATalog:FSK?`

This command outputs a list of the FSK files. The return data will be in the following form:

`<mem used>,<mem free>{,"<file listing>"}`

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

`"<file name,file type,file size>"`

Key Entry **FIR**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:CATalog:IQ

Supported E4438C with Option 001/601or 002/602

`:MEMory:CATalog:IQ?`

This command outputs a list of the IQ files. The return data will be in the following form:

`<mem used>,<mem free>{,"<file listing>"}`

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

`"<file name,file type,file size>"`

Key Entry **I/Q**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:CATalog:LIST

Supported All Models

`:MEMory:CATalog:LIST?`

This command outputs a list of the list sweep files. The return data will be in the following form:

`<mem used>,<mem free>{,"<file listing>"}`

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

`"<file name,file type,file size>"`

Key Entry **List**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:CATalog:MCDMa

Supported E4438C with Option 401

`:MEMory:CATalog:MCDMa?`

This command outputs a list of the arbitrary waveform multicarrier IS-95 CDMA files. The return data will be in the following form:

`<mem used>,<mem free>{,"<file listing>"}`

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

`"<file name,file type,file size>"`

Key Entry **MCDMA**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:CATalog:MDMod

Supported E4438C with Option 001/601or 002/602

`:MEMory:CATalog:MDMod?`

This command outputs a list of the arbitrary waveform multicarrier digital modulation files. The return data will be in the following form:

`<mem used>,<mem free>{,"<file listing>"}`

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

`"<file name,file type,file size>"`

Key Entry **MDMOD**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:CATalog:MDWCdma

Supported E4438C with Option 400

`:MEMory:CATalog:MDWCdma?`

This command outputs a list of the arbitrary waveform multicarrier downlink W-CDMA files. The return data will be in the following form:

`<mem used>,<mem free>{,"<file listing>"}`

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

`"<file name,file type,file size>"`

Key Entry **MDWCDMA**

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:CATalog:MFCdma

Supported E4438C with Option 401

`:MEMory:CATalog:MFCdma?`

This command outputs a list of the arbitrary waveform multicarrier forward link cdma2000 files. The return data will be in the following form:

`<mem used>,<mem free>{,"<file listing>"}`

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

`"<file name,file type,file size>"`

Key Entry **MFCDMA**

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:CATalog:MTONe

Supported E4438C with Option 001/601or 002/602

`:MEMory:CATalog:MTONe?`

This command outputs a list of the arbitrary waveform multitone files. The return data will be in the following form:

`<mem used>,<mem free>{,"<file listing>"}`

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

`"<file name,file type,file size>"`

Key Entry **MTONE**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:CATalog:RCDMa

Supported E4438C with Option 401

`:MEMory:CATalog:RCDMa?`

This command outputs a list of the arbitrary waveform files for reverse link cdma2000. The return data will be in the following form:

`<mem used>,<mem free>{,"<file listing>"}`

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

`"<file name,file type,file size>"`

Key Entry **RCDMA**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:CATalog:SEQ

Supported E4438C with Option 001/601or 002/602

`:MEMory:CATalog:SEQ?`

This command outputs a list of the arbitrary waveform sequence files. The return data will be in the following form:

`<mem used>,<mem free>{,"<file listing>"}`

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

`"<file name,file type,file size>"`

Key Entry **SEQ**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:CATalog:SHAPe

Supported E4438C with Option 001/601or 002/602

`:MEMory:CATalog:SHAPe?`

This command outputs a list of the burst shape files. The return data will be in the following form:

`<mem used>,<mem free>{,"<file listing>"}`

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

`"<file name,file type,file size>"`

Key Entry **SHAPE**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:CATalog:STATe

Supported All Models

`:MEMory:CATalog:STATe?`

This command outputs a list of the state files. The return data will be in the following form:

`<mem used>,<mem free>{,"<file listing>"}`

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

`"<file name,file type,file size>"`

Key Entry **State**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:CATalog:UFLT

Supported All Models

`:MEMory:CATalog:UFLT?`

This command outputs a list of the user-flatness correction files. The return data will be in the following form:

`<mem used>,<mem free>{,"<file listing>"}`

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

`"<file name,file type,file size>"`

Key Entry **User Flatness**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:CATalog:UWCDma

Supported E4438C with Option 400

`:MEMory:CATalog:UWCDma?`

This command outputs a list of the arbitrary waveform uplink W-CDMA files. The return data will be in the following form:

`<mem used>,<mem free>{,"<file listing>"}`

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

`"<file name,file type,file size>"`

Key Entry **UWCDMA**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:CATalog[:ALL]

Supported All Models

`:MEMory:CATalog[:ALL]?`

This command outputs a list of all the files in the memory subsystem. However it does not include files stored on the Option 001/601or 002/602 baseband generator. The return data will be in the following form:

`<mem used>,<mem free>{,"<file listing>"}`

The signal generator will return the two memory usage parameters and as many file listings as there are files in the memory subsystem. Each file listing parameter will be in the following form:

`"<file name,file type,file size>"`

Key Entry **All**

Remarks Refer to the Table on page 14 for a listing of the file types and "File Name Variables" on page 13 for information on the `"<file name>"` syntax.

:COPY[:NAME]

Supported All Models

`:MEMory:COPY[:NAME] "<file name>","<file name>"`

This command makes a duplicate of the requested file.

Key Entry **Copy File**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

When copying a waveform file from volatile to non-volatile memory, the marker file and file header, associated with the waveform file, will automatically be copied at the same time.

:DATA

Supported E4438C with Option 001/601 or 002/602

`:MEMory:DATA "<file_name>",<data_block>`

`:MEMory:DATA? "<file_name>"`

This command loads waveform data into signal generator memory using the `<data_block>` parameter and saves the data to a file designated by the `"<file_name>"` variable. The query returns the file contents of the file as a datablock.

The waveform file must be located in volatile waveform memory (WFM1) before it can be played by the signal generator's dual ARB player.

For downloads directly into volatile waveform memory use the path `"WFM1:<file_name>"`. For downloads to non-volatile waveform memory, use the path `"NVWFM:<file_name>"`.

`"<file_name>"` This variable names the destination file, including the directory path.

`<data_block>` This parameter represents the data and file length parameters. The data in the file is represented by the `<data_block>` variable.

Refer to the *E4428C/38C ESG Signal Generators Programming Guide* for more information on programming the status registers.

NOTE ARB waveform files created using the :DATA command cannot be retrieved or uploaded. Attempting to do so will cause the signal generator to display the message: `ERROR:221, Access denied.` To download ARB data to files for later retrieval, use the ":DATA:UNPRotected"command on page 116.

Example

```
:MEM:DATA "NVWFM:IQ_Data",#210Qaz37pY9oL
```

The preceding example downloads 10 bytes of data to a file, `IQ_Data`., in the signal generator's non-volatile memory. The table shown below describes the command parameters.

• `"NVWFM:IQ_Data"`	`IQ_Data` is the file name. The directory path is not needed. The path `"/USER/WAVEFORM/"` is implied.
• `#210Qaz37pY9oL`	Data block
`#`	This character indicates the beginning of the data block
`2`	Number of digits in the byte count
`10`	Byte count
`Qaz37pY9oL`	10 bytes of data

NOTE The data, `Qaz37pY9oL`, in the above command are not valid and are shown for example purposes only. Typically, ascii characters representing data are unprintable.

Remarks See "File Name Variables" on page 13 for information on the file name syntax.

:DATA:APPend

Supported E4438C with Option 001/601or 002/602

```
:MEMory:DATA:APPend "<file_name>",<data_block>
```

This commands appends data to an existing file stored in signal generator memory.

`"<file_name>"` This variable names the destination file and directory path.

`<data_block>` This parameter represents the data and file length parameters. The data in the file is represented by the `<data_block>` variable. The file length parameters are used by the signal generator for allocating memory.

Refer to the *E4428C/38C ESG Signal Generators Programming Guide* for more information on downloading and using files.

Example

`:MEM:DATA:APPend "NVWFM:IQ_Data",#14Y9oL`

The preceding example downloads and appends the data, `Y9oL`, to an existing file named `IQ_Data` stored in the signal generator's non-volatile memory (NVWFM).

• `"NVWFM:IQ_Data"`	`IQ_Data` the file name. The directory path is not needed. The path `"/USER/WAVEFORM/"` is implied.
• `#14Y9oL`	Data block
`#`	This character indicates the beginning of the data block
`1`	Number of digits in the byte count
`4`	Byte count
`Y9oL`	4 bytes of data

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:DATA:BIT

Supported E4438C with Option 001/601or 002/602

```
:MEMory:DATA:BIT "<file_name>",<bit_count>,<data_block>
:MEMory:DATA:BIT? "<file_name>"
```

This command loads bit data into signal generator memory using the `<bit_count>` and `<data_block>` parameters and saves the data to a file designated by the `"<file_name>"` variable. The query returns the bit count, file length information, and the data.

`"<file_name>"`	This variable names the destination file and the directory path.
`<bit_count>`	This number represents the number of bits in the data block.
`<data_block>`	This parameter represents the data and file length parameters. The data in the file is represented by the `<data_block>` variable. The file length parameters are used by the signal generator for allocating memory.

Refer to the *E4428C/38C ESG Signal Generators Programming Guide* for more information on downloading and using files.

Example

`:MEM:DATA:BIT "Test_Data",16,#12Qz`

The preceding example downloads bit data to the file, `Test_Data`. The table below describes the command parameters.

•	`"Test_Data"`	`Test_Data` is the file name. The directory path is not needed. The path `"/USER/BIT/"` is implied.
•	`16`	Number of bits in the data block
•	`#12Qz`	Data block
	`#`	This character indicates the beginning of the data block
	`1`	Number of digits in the byte count
	`2`	Byte count
	`Qz`	16 bits of data (ascii representation of bit data)

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:DATA:FIR

Supported E4438C with Option 001/601or 002/602

```
:MEMory:DATA:FIR "<file_name>",osr,coefficient{,coefficient}
:MEMory:DATA:FIR? "<file_name>"
```

This command loads oversample ratio (OSR) and user-defined finite impulse response (FIR) coefficient data into a file in the signal generator's non-volatile memory (NVWFM). The query returns the oversample ratio and coefficient data.

`"<file_name>"`	This variable is the file name of the destination file. The directory path, `/USER/FIR` is not required as it is implied by the command.
`osr`	The OSR is the number of filter taps per symbol.
`coefficient`	This variable is the FIR coefficient. The maximum number of coefficients is 1024.
`{,coefficient}`	This optional variable is used when you enter additional coefficients.

Refer to the *E4428C/38C ESG Signal Generators Programming Guide* for more information on downloading and using files.

Example

```
:MEM:DATA:FIR "FIR_1",4,0,0,0,0,0,0.000001,0.000012,0.000132,
0.001101,0.006743,0.030588,0.103676,0.265790,0.523849,0.809508,1,1,
0.809508,0.523849,0.265790,0.103676,0.030588,0.006743,0.001101,0.000132,
0.000012,0.000001,0,0,0,0,0
```

The preceding example downloads FIR coefficient and oversampling ratio data to the signal generator's non-volatile memory in a file named FIR_1. Notice that the signal generator directory path, `/USER/FIR`, is not needed as it is implied by the command. Refer to “File Name Variables” on page 13 for information on the file name syntax.

Range *osr:* 1–32

coefficient: –1000 to 1000

Key Entry **Oversample Ratio**

:DATA:FSK

Supported E4438C with Option 001/601or 002/602

```
:MEMory:DATA:FSK "<file_name>",<num_states>,<f0>,<f1>,...<f(n)>
[,<diff_state>,<num_diff_states>,<diff1>,...<diff(n)>]
:MEMory:DATA:FSK? "<file_name>"
```

This command loads custom frequency shift keying (FSK) data into a file in the signal generator’s non-volatile memory (NVWFM).

The query returns data in the following form:

```
<num_states>,<f0>,<f1>,...<f(n)>,<diff_state>,<num_diff_states>,<diff1>,
...<diff(n)>
```

"<file_name>" This variable string identifies the name of the FSK file. The filename must be enclosed with quotation marks.

<num_states> This variable identifies the number of frequency states.

<f0> This variable identifies the value of the first frequency state.

<f1>,...<f(n)> This variable identifies the value of the second and subsequent frequency states with a frequency resolution of 0.1Hz.

<diff_state> This variable enables or disables differential encoding.

<num_diff_states> This variable identifies the number of differential states.

<diff0> This variable identifies the value of the first differential state.

<diff1>,...<diff(n)> This variable identifies the value of the second and subsequent differential states.

Refer to the *E4428C/38C ESG Signal Generators Programming Guide* for more information on downloading and using files.

Example

```
:MEM:DATA:FSK "4FSK",4,–2kHZ,–1kHZ,2kHZ,1kHZ,ON,2,1,0
```

The preceding example downloads a four-level FSK data to a file named `4FSK`. There are four states (frequencies): –2kHZ, –1kHZ, 2kHZ, 1kHZ; differential encoding is toggled ON, and there are two differential states 1 and 0. The table shown below describes the command parameters.

• `"4FSK"`	`4FSK` is the FSK file name. The directory path is not needed. The path `"/USER/FSK"` is implied.
• `4`	Number of states
• `-2kHz`	First frequency state
• `-1kHz`	Second frequency state
• `2kHz`	Third frequency state
• `1kHz`	Fourth frequency state
• `ON`	Differential encoding is on
• `2`	Number of differential states
• `1`	Value of the first differential state.
• `0`	Value of the second differential state.

Range *num_diff_states:* 0–256

num_states: 2–16

f0–f(n): –20MHZ to 20MHZ

diff0–diff(n): –128 to 127

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:DATA:IQ

Supported E4438C with Option 001/601or 002/602

```
:MEMory:DATA:IQ "<file_name>",<offsetQ>,<num_states>,<i0>,<q0>,<i1>,
<q1>,...<i(n)>,<q(n)>[,<diff_state>,<num_diff_states>,<diff0>,<diff1>,..
<diff(n)>]
:MEMory:DATA:IQ? "<file_name>"
```

This command loads custom I/Q data into a file in the signal generator’s non-volatile waveform memory (NVWFM).

The query returns data in the following form:

```
<offsetQ>,<num_states>,<i0>,<q0>,<i1>,<q1>,...<i(n)>,<q(n)>,<diff_state>
,<num_diff_states>,<diff0>,<diff1>,...<diff(n)>
```

"<file_name>" This variable string identifies the name of the I/Q file. The filename must be enclosed with quotation marks.

<offsetQ> This variable enables (1) or disables (0) the Q output delay by 1/2 symbol from the I output.

<num_states> This is the number of symbols.

<i0>...<i(n)> This is the I value of the first and subsequent I symbols.

<q0>...<q(n)> This is the Q value of the first and subsequent Q symbols.

<diff_state> This variable enables and disables differential encoding.

<num_diff_states> This variable identifies the number of differential states.

<diff0> This variable identifies the value of the first differential state.

<diff1,...diff(n)> This variable identifies the value of the second and subsequent differential states.

Refer to the *E4428C/38C ESG Signal Generators Programming Guide* for more information on downloading and using files.

Example

```
:MEM:DATA:IQ "Test_BPSK",1,2,1,0,0,0
```

The preceding example loads and stores a two-symbol I/Q file named `Test_BPSK` that has a Q offset. The table shown below describes the command parameters.

• "Test_BPSK"	`Test_BPSK` is the file name. The directory path is not needed. The path "/USER/IQ" is implied.
• 1	Q Offset. The Q output delay is enabled.
• 2	Number of symbols
• 1	Value of the first I symbol
• 0	Value of the first Q symbol.
• 0	Value of the second I symbol
• 0	Value of the second Q symbol

Range	*num_states:* 2–256
	i0–i(n): –1 to 1
	q0–q(n): –1 to 1
	num_diff_states: 0–256
	diff0–diff(n): -128 to 127
Remarks	Refer to "File Name Variables" on page 13 for information on the file name syntax.

:DATA:PRAM:FILE:BLOCk

Supported E4438C with Option 001/601or 002/602

```
:MEMory:DATA:PRAM:FILE:BLOCk "<file_name>", <data_block>
```

This command loads block-formatted data directly into pattern RAM volatile memory (WFM1). Pattern RAM memory describes how memory (WFM1) is used and is not a distinct piece of memory. A PRAM file is specified as an array of bytes.

`"<file_name>"`	This variable names the destination file. No directory path name is needed.
`<data_block>`	This parameter represents the data and file length parameters. The data in the file is represented by the `<data_block>` variable. The file length parameters are used by the signal generator for allocating memory.

Pattern Ram files are binary files downloaded directly into waveform memory as an array of bytes. Each byte specifies a data bit (`LSB 0`), a burst bit (`BIT 2`), and an Event 1 output bit (`BIT 6`). Refer to the *E4428C/38C ESG Signal Generators Programming Guide* for more information on pattern RAM downloading.

Example

```
:MEM:DATA:PRAM:FILE:BLOC "PRAM_Data",#14Yq8L
```

The preceding example downloads PRAM data to a file named `PRAM_Data` into the signal generator's volatile memory (WFM1).

- `"PRAM_Data"` — `PRAM_Data` is the file name. PRAM files are saved to the signal generator's volatile memory (WFM1).
- `#14Yq8L` — Data block

`#`	This character indicates the beginning of the data block
`1`	Number of digits in the byte count
`4`	Byte count
`Yq8L`	4 bytes of data

NOTE	The data, `Yq8L`, in the above command is not valid and is used for example purposes only. Typically, ASCII characters representing data are unprintable.

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:DATA:PRAM:FILE:LIST

Supported E4438C with Option 001/601or 002/602

`MEMory:DATA:PRAM:FILE:LIST "<file_name>",<uint8>[,<uint8>,<...>]`

This command loads list-formatted data directly into pattern RAM volatile memory (WFM1). Pattern RAM memory describes how memory (WFM1) is used and is not a distinct piece of memory. A PRAM file is specified as an array of bytes.

NOTE	This command should be preceded by a *WAI (Wait-to-Continue) command to ensure that all pending operations are completed, before loading the list.

`"<file_name>"`	This variable names the destination file.
`<uint8>`	This variable is any of the valid 8-bit, unsigned integer values between 0 and 255.
`[,<uint8>,<...>]`	This variable identifies the value of the second and subsequent 8-bit unsigned integer variables.

Pattern Ram files are binary files downloaded directly into waveform memory as an array of bytes. Each byte specifies a data bit (`LSB 0`), a burst bit (`BIT 2`), and an Event 1 output bit (`BIT 6`). Refer to the *E4428C/38C ESG Signal Generators Programming Guide* for more information on pattern RAM downloading.

Example

```
:MEM:DATA:PRAM:FILE:LIST "Pram_Data", 85,21,21,20,20,100
```

The preceding example downloads PRAM data, in list format, to a file named `Pram_Data` in the signal generator’s volatile memory (WFM1).

• `"Pram_Data"`	`Pram_Data` is the file name. PRAM files are saved to the signal generator’s volatile memory (WFM1).
• `85`	The first 8-bit integer value
• `21,21,20,20,100`	Subsequent 8-bit integer values.

Range 0–255

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:DATA:PRAM

NOTE Refer to the *E4428C/38C ESG Signal Generators Programming Compatibility Guide* for information on this command. This command is still valid for backward compatibility with earlier signal generator models.

:DATA:PRAM:BLOCk

NOTE Refer to the *E4428C/38C ESG Signal Generators Programming Compatibility Guide* for information on this command. This command was replaced by “:DATA:PRAM:FILE:BLOCk” on page 112.

:DATA:PRAM:LIST

NOTE Refer to the *E4428C/38C ESG Signal Generators Programming Compatibility Guide* for information on this command. This command has been replaced by “:DATA:PRAM:FILE:LIST” on page 113.

:DATA:SHAPe

Supported E4438C with Option 001/601or 002/602

```
:MEMory:DATA:SHAPe "<filename>",<num_rise_points>,<rp0>,<rp1>,
...<num_fall_points>,<fp0>,<fp1>,...<fp(n)>
:MEMory:DATA:SHAPe? "<filename>"
```

This command creates a new burst shape file and stores it in the signal generator non-volatile memory.

"<filename>"	This variable string identifies the name of the burst shape file.
num_rise_points	This variable specifies how many rise points used in the command.
rp0,...rp(n)	This variable defines each successive rise point, where 0 is no power and 1 is full power.
num_fall_points	This variable specifies how many fall points used in the command.

fp0,...fp(n) This variable defines each successive fall point, where 0 is no power and 1 is full power.

Range num_rise_points: 2–256 num_fall_points: 2–256

rp0–rp(n): 0.0–1.0 fp0–fp(n): 0.0–1.0

:DATA:SHAPe

Supported E4438C with Option 001/601or 002/602

```
:MEMory:DATA:SHAPe
"<file_name>",<rise_pnts>,<rp0>,<rp1>,...<fall_points>,<fp0>,
<fp1>,...<fp(n)>
:MEMory:DATA:SHAPe? "<file_name>"
```

This command loads a burst shape file into the signal generator’s non–volatile memory (NVWFM).

`"<file_name>"` This variable names the destination file and directory path.

`rise_pnts` This variable indicates the number of rise points used to describe the burst shape rising slope.

`rp0,...rp(n)` This variable defines each successive rise point, where 0 is no power and 1 is full power.

`fall_points` This variable indicates the number of fall points used to describe the burst shape falling slope.

`fp0,...fp(n)` This variable defines each successive fall point, where 1 is full power and 0 is no power.

Refer the *E4428C/38C ESG Signal Generators Programming Guide* for more information on downloading and using files.

Example

```
:MEM:DATA:SHAP "Shape_File",6,0,0.2,0.4,0.6,0.8,1.0,2,0.5,0
```

The preceding example loads shape data to a file named `Shape_File` in the signal generator’s non-volatile memory.

- `"Shape_File"` — `Shape_File` is the shape data filename. The directory path is not needed. The path `"/USER/SHAPE/"` is implied.
- `6` — Number of rise points describing the burst shape.
- `0,0.2,0.4,0.6,0.8,1.0` — Rise point values.
- `2` — Number of fall points describing the burst shape.
- `0.5,0` — Fall point values.

Range *num_rise_points:* 2–256

num_fall_points: 2–256

rp0–rp(n): 0.0–1.0

fp0–fp(n): 0.0–1.0

:DATA:UNPRotected

Supported E4438C with Option 001/601or 002/602

```
:MEMory:DATA:UNPRotected "<file_name>",<data_block>
```

This command allows you to download data and store it in a file on the signal generator with the ability to retrieve it. This command is intended for downloading waveform data; however you can use it to download other types of data.

NOTE If you do not use the *UNPRotected* command when downloading a waveform file, you will not be able to retrieve or upload the file. Attempting to do so will cause the signal generator to display the message: `ERROR:221, Access denied`.

`"<file_name>"` This variable names the destination file and directory path.The file type determines how you must format the "<file_name>" variable as described in the following list.

- Binary file — The "<file_name>" variable requires only a file name. A file name without a file path is automatically stored in the Binary memory catalog. Refer to “File Name Variables” on page 13 for information on the file name syntax.
- Encrypted file — The "<file_name>" variable requires a path that includes the SECUREWAVE directory. The securewave directory path is SNVWFM: for non-volatile waveform memory and SWFM1: for volatile waveform memory.
- All other file types — The "<file_name>" variable requires a path that includes the destination directory for the file type. Refer to the Table on page 14, and “File Name Variables” on page 13 for more information.

`<data_block>` This parameter represents the data and file length parameters. The data in the file is represented by the <data_block> variable.

Refer to the *E4428C/38C ESG Signal Generators Programming Guide* for more information on downloading and using files.

Example

```
:MEM:DATA:UNPR "NVWFM:Data_File",#18Qz37pY9o
```

The preceding example downloads waveform data to a file named `Data_File` in the signal generator's non-volatile securewave directory. The table shown below describes the command parameters.

• `"NVWFM:Data_File"`	`Data_File` is the filename. The directory path is not needed. The path `"/USER/SECUREWAVE"` is implied.
• `#18Qz37pY9o`	Data block
#	This character indicates the beginning of the data block
1	Number of digits in the byte count
8	Byte count
`Qz37pY9o`	8 bytes of data

NOTE The data, `Qz37pY9o`, in the above command is not valid and is used for example purposes only. Typically, ascii characters representing data are unprintable.

:DELete:ALL

Supported All Models

CAUTION Using this command deletes all user files including binary, list, state, and flatness correction files, and any saved setups which use the front panel table editor. However, this does not include files stored on the Option 001/601or 002/602 baseband generator. You cannot recover the files after executing this command.

```
:MEMory:DELete:ALL
```

This command clears the file system of all user files.

Key Entry **Delete All Files**

:DELete:BINary

Supported E4438C with Option 001/601or 002/602

`:MEMory:DELete:BINary`

This command deletes all binary files.

Key Entry **Delete All Binary Files**

:DELete:BIT

Supported E4438C with Option 001/601or 002/602

`:MEMory:DELete:BIT`

This command deletes all bit files.

Key Entry **Delete All Bit Files**

:DELete:CDMa

NOTE Refer to the *E4428C/38C ESG Signal Generators Programming Compatibility Guide* for information on this command. This command is still valid for backward compatibility and was replaced by ":DELete:CDMA" .

:DELete:CDMA

Supported E4438C with Option 401

`:MEMory:DELete:CDMA`

This command deletes all arbitrary waveform IS-95 CDMA files.

Key Entry **Delete All ARB CDMA Files**

:DELete:DMOD

Supported E4438C with Option 001/601or 002/602

`:MEMory:DELete:DMOD`

This command deletes all arbitrary waveform digital modulation files.

Key Entry **Delete All ARB DMOD Files**

:DELete:DWCDma

Supported E4438C with Option 400

`:MEMory:DELete:DWCDma`

This command deletes all arbitrary waveform downlink W-CDMA files.

Key Entry **Delete All ARB DWCDMA Files**

:DELete:FCDMa

Supported E4438C with Option 401

`:MEMory:DELete:FCDMa`

This command deletes all arbitrary waveform forward link W-CDMA files.

Key Entry **Delete All ARB FCDMA Files**

:DELete:FIR

Supported E4438C with Option 001/601or 002/602

`:MEMory:DELete:FIR`

This command deletes all finite impulse response filter files.

Key Entry **Delete All FIR Files**

:DELete:FSK

Supported E4438C with Option 001/601or 002/602

`:MEMory:DELete:FSK`

This command deletes all FSK files.

Key Entry **Delete All FSK Files**

:DELete:IQ

Supported E4438C with Option 001/601or 002/602

`:MEMory:DELete:IQ`

This command deletes all I/Q files.

Key Entry **Delete All I/Q Files**

:DELete:LIST

Supported All Models

`:MEMory:DELete:LIST`

This command deletes all List files.

Key Entry **Delete All List Files**

:DELete:MCDMa

Supported E4438C with Option 401

`:MEMory:DELete:MCDMa`

This command deletes all arbitrary waveform multicarrier IS-95 CDMA files.

Key Entry **Delete All ARB MCDMA Files**

:DELete:MDMod

Supported E4438C with Option 001/601or 002/602

`:MEMory:DELete:MDMod`

This command deletes all arbitrary waveform multicarrier digital modulation files.

Key Entry **Delete All ARB MDMOD Files**

:DELete:MDWCdma

Supported E4438C with Option 400

`:MEMory:DELete:MDWCdma`

This command deletes all arbitrary waveform multicarrier downlink W-CDMA files.

Key Entry **Delete All ARB MDWCDMA Files**

:DELete:MFCdma

Supported E4438C with Option 401

`:MEMory:DELete:MFCdma`

This command deletes all arbitrary waveform multicarrier forward link cdma2000 files.

Key Entry **Delete All ARB MFCDMA Files**

:DELete:MTONe

Supported E4438C with Option 001/601or 002/602

`:MEMory:DELete:MTONe`

This command deletes all arbitrary waveform multitone files.

Key Entry **Delete All ARB MTONE Files**

:DELete:RCDMa

Supported E4438C with Option 401

`:MEMory:DELete:RCDMa`

This command deletes all arbitrary waveform reverse link cdma2000 files.

Key Entry **Delete All ARB RCDMA Files**

:DELete:SEQ

Supported E4438C with Option 001/601or 002/602

`:MEMory:DELete:SEQ`

This command deletes all sequence files.

Key Entry **Delete All Sequence Files**

:DELete:SHAPe

Supported E4438C with Option 001/601or 002/602

`:MEMory:DELete:SHAPe`

This command deletes all burst shape files.

Key Entry **Delete All Shape Files**

:DELete:STATe

Supported All Models

`:MEMory:DELete:STATe`

This command deletes all state files.

Key Entry **Delete All Models State Files**

:DELete:UFLT

Supported All Models

`:MEMory:DELete:UFLT`

This command deletes all user-flatness correction files.

Key Entry **Delete All UFLT Files**

:DELete:UWCDma

Supported E4438C with Option 400

`:MEMory:DELete:UWCDma`

This command deletes all arbitrary waveform uplink W-CDMA files.

Key Entry **Delete All ARB UWCDMA Files**

:DELete[:NAME]

Supported All Models

`:MEMory:DELete[:NAME] "<file name>"`

This command clears the user file system of "<file name>".

Key Entry **Delete File**

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

When deleting a waveform (WFM1) file from memory, the marker file and file header, associated with the waveform file, will also be deleted.

:FREE[:ALL]

Supported All Models

`:MEMory:FREE[:ALL]?`

This command returns the number of bytes left in the user file system.

Key Entry **All**

:LOAD:LIST

Supported All Models

```
:MEMory:LOAD:LIST "<file name>"
```

This command loads a list sweep file.

Key Entry **Load From Selected File**

:MOVE

Supported All Models

```
:MEMory:MOVE "<src_file>","<dest_file>"
```

This command renames the requested file in the memory catalog.

Key Entry **Rename File**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:STATe:COMMent

Supported All Models

```
:MEMory:STATe:COMMent <reg_num>,<seq_num>,"<comment>"
:MEMory:STATe:COMMent? <reg_num>,<seq_num>
```

This command lets you to add a descriptive comment to the saved state <reg_num>,<seq_num>. Comments can be up to 55 characters long.

Key Entry **Add Comment To Seq[n] Reg[nn]**

:STORe:LIST

Supported All Models

```
:MEMory:STORe:LIST "<file name>"
```

This command stores the current list sweep data to a file.

Key Entry **Store To File**

Mass Memory Subsystem (:MMEMory)

:CATalog

Supported All Models

`:MMEMory:CATalog? "<msus>"`

This command outputs a list of the files from the specified file system.

The variable `"<msus>"` (mass storage unit specifier) represents `"<file system>"`. The file systems and types are shown in Table 1-4 on page 14.

The return data will be in the following form:

`<mem used>,<mem free>{,"<file listing>"}`

The signal generator will return the two memory usage parameters and as many file listings as there are files in the specified file system. Each file listing will be in the following format:

`"<file name,file type,file size>"`

Key Entry **Binary** **List** **State** **User Flatness** **FIR** **Shape** **Bit** **FSK** **IQ** **Seq** **DMOD** **MTONE** **MDMOD** **CDMA** **MCDMA** **FCDMA** **MFCDMA** **RCDMA** **WCDMA** **FWCDMA** **MFWCDMA** **RWCDMA** **DWCDMA** **MDWCDMA** **UWCDMA** **WFM1** **NVMKR** **NVWFM**

Remarks Refer to "MSUS (Mass Storage Unit Specifier) Variable" on page 16 for information on the use of the `"<msus>"` variable.

:COPY

Supported All Models

`:MMEMory:COPY "<file name>","<file name>"`

This command makes a duplicate of the requested file.

Key Entry **Copy File**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

When copying a waveform file from volatile to non-volatile memory, the marker file and file header, associated with the waveform file, will automatically be copied at the same time.

:DATA

Supported E4438C with Option 001/601or 002/602

```
:MMEMory:DATA "<file name>",<datablock>
:MMEMory:DATA? "<file name>"
```

This command loads <datablock> into the memory location `"<file name>"`.

The query returns the <datablock> associated with the `"<file name>"`.

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:DELete:NVWFm

Supported E4438C with Option 001/601or 002/602

```
:MMEMory:DELete:NVWFm
```

This command clears the user file system of all non-volatile arbitrary waveform files.

Key Entry **Delete All NVWFM Files**

:DELete:WFM

Supported E4438C with Option 001/601or 002/602

```
:MMEMory:DELete:WFM
```

This command clears the user file system of all arbitrary waveform files, which is the same function as performed by the command shown in ":DELete:WFM1" .

Key Entry **Delete All WFM1 Files**

:DELete:WFM1

Supported E4438C with Option 001/601or 002/602

```
:MMEMory:DELete:WFM1
```

This command clears the user file system of all arbitrary waveform files, which is the same function as performed by the command shown in ":DELete:WFM" .

Key Entry **Delete All WFM1 Files**

:DELete[:NAME]

Supported All

`:MMEMory:DELete[:NAME] "<file name>",["<msus>"]`

This command clears the user file system of "<file name>" with the option of specifying the file system separately.

The variable `"<msus>"` (mass storage unit specifier) represents the file system. For a list of the file systems refer to the Table on page 14.

Key Entry **Delete File**

Remarks If the optional variable "<msus>" is omitted, the file name needs to include the file system extension. Refer to "File Name Variables" on page 13 and "MSUS (Mass Storage Unit Specifier) Variable" on page 16 for information on the use of the file variables.

When deleting a waveform file from memory, the marker file and file header, associated with the waveform file, will also be deleted.

:HEADer:CLEar

Supported E4438C with Option 001/601or 002/602

`:MMEMory:HEADer:CLEar "<file name>"`

This command sets the file header field settings to unspecified for the `"<file name>"` variable.

Key Entry **Clear Header**

Remarks This command does not require a personality modulation to be on. Refer to "File Name Variables" on page 13 for information on the file name syntax.

:HEADer:DESCription

Supported E4438C with Option 001/601or 002/602

`:MMEMory:HEADer:DESCription "<file name>","<description>"`

`:MMEMory:HEADer:DESCription? "<file name>"`

This command inserts a description for the file header.

Key Entry **Edit Description**

Remarks The header description is limited to 32 characters. Refer to "File Name Variables" on page 13 for information on the file name syntax.

:LOAD:LIST

Supported All

`:MMEMory:LOAD:LIST "<file name>"`

This command loads a List sweep file.

Key Entry **Load From Selected File**

:MOVE

Supported All

`:MMEMory:MOVE "<src_file>","<dest_file>"`

This command renames the requested file in the memory catalog.

Key Entry **Rename File**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:STORe:LIST

Supported All

`:MMEMory:STORe:LIST "<file name>"`

This command stores the current list sweep data to a file.

Key Entry **Store To File**

Output Subsystem (:OUTPut)

:BLANking:AUTO

Supported All

```
:OUTPut:BLANking:AUTO ON|OFF|1|0
:OUTPut:BLANKing:AUTO?
```

This command turns the RF output on or off during frequency band changes. Frequency band changes can cause the signal generator's RF output to fluctuate. The output blanking function, when active, turns off the RF output until the frequency settles.

`ON(1)` The RF output turns off when crossing a frequency band.

`OFF(0)` The RF output stays on when crossing a frequency band.

***RST** 1

Key Entry **Output Blanking Off On Auto**

Remarks Refer to the signal generator's data sheet for information on frequency switching speeds, settling times, and frequency band information.

:BLANking:STATe

Supported All

```
:OUTPut:BLANking:STATe ON|OFF|1|0
:OUTPut:BLANKing:STATe?
```

This command enables or disables the RF output blanking state.

`ON(1)` The RF output turns off during frequency changes.

`OFF(0)` The RF output stays on during frequency changes.

***RST** 1

Remarks Refer to the signal generator's data sheet for information on frequency switching speeds, settling times, and frequency band information.

:MODulation[:STATe]

Supported All

```
:OUTPut:MODulation[:STATe] ON|OFF|1|0
:OUTPut:MODulation[:STATe]?
```

This command enables or disables the modulation of the RF output with the currently active modulation type(s).

***RST** 1

Key Entry **Mod On/Off**

Remarks Some modulation types can be simultaneously enabled such as pulse and AM.

An annunciator on the signal generator is always displayed to indicate whether modulation is switched on or off.

[:STATe]

Supported All

```
:OUTPut[:STATe] ON|OFF|1|0
:OUTPut[:STATe]?
```

This command enables or disables the RF output.

***RST** 0

Key Entry **RF On/Off**

Remarks Although you can configure and engage various modulations, no signal is available at the RF OUTPUT connector until this command is executed.

An annunciator is always displayed on the signal generator to indicate whether the RF output is switched on or off.

Route Subsystem (:ROUTe:HARDware:DGENerator)

:INPut:BPOLarity

Supported E4438C with Option 001/601or 002/602

```
:ROUTe:HARDware:DGENerator:INPut:BPOLarity POSitive|NEGative
:ROUTe:HARDware:DGENerator:INPut:BPOLarity?
```

This command configures the polarity of the TTL input signal at the BURST GATE IN connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry **Burst Gate In Polarity Neg Pos**

Remarks This command performs the same function as “:IPOLarity:BGATe” on page 131.

:INPut:CPOLarity

Supported E4438C with Option 001/601or 002/602

```
:ROUTe:HARDware:DGENerator:INPut:CPOLarity POSitive|NEGative
:ROUTe:HARDware:DGENerator:INPut:CPOLarity?
```

This command configures the polarity of the TTL input signal at the DATA CLOCK connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry **Data Clock Polarity Neg Pos**

Remarks This command performs the same function as “:IPOLarity:CLOCk” on page 132.

:INPut:DPOLarity

Supported E4438C with Option 001/601or 002/602

```
:ROUTe:HARDware:DGENerator:INPut:DPOLarity POSitive|NEGative
:ROUTe:HARDware:DGENerator:INPut:DPOLarity?
```

This command configures the polarity of the TTL input signal at the DATA connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry **Data Polarity Neg Pos**

Remarks This command performs the same function as ":IPOLarity:DATA" on page 132.

:INPut:SPOLarity

Supported E4438C with Option 001/601or 002/602

```
:ROUTe:HARDware:DGENerator:INPut:SPOLarity POSitive|NEGative
:ROUTe:HARDware:DGENerator:INPut:SPOLarity?
```

This command configures the polarity of the TTL input signal at the SYMBOL SYNC connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry **Symbol Sync Polarity Neg Pos**

Remarks This command performs the same function as ":IPOLarity:SSYNc" on page 132.

:IPOLarity:BGATe

Supported E4438C with Option 001/601or 002/602

```
:ROUTe:HARDware:DGENerator:IPOLarity:BGATe POSitive|NEGative
:ROUTe:HARDware:DGENerator:IPOLarity:BGATe?
```

This command configures the polarity of the input signal at the BURST GATE IN connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry **Burst Gate In Polarity Neg Pos**

Remarks This command performs the same function as ":INPut:BPOLarity" on page 130.

:IPOLarity:CLOCk

Supported E4438C with Option 001/601or 002/602

```
:ROUTe:HARDware:DGENerator:IPOLarity:CLOCk POSitive|NEGative
:ROUTe:HARDware:DGENerator:IPOLarity:CLOCk?
```

This command configures the polarity of the TTL input signal at the DATA CLOCK connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry **Data Clock Polarity Neg Pos**

Remarks This command performs the same function as ":INPut:CPOLarity" on page 130.

:IPOLarity:DATA

Supported E4438C with Option 001/601or 002/602

```
:ROUTe:HARDware:DGENerator:IPOLarity:DATA POSitive|NEGative
:ROUTe:HARDware:DGENerator:IPOLarity:DATA?
```

This command configures the polarity of the TTL input signal at the DATA connector. POSitive refers to normal logic, while NEGative refers the inverted logic.

***RST** POS

Key Entry **Data Polarity Neg Pos**

Remarks This command performs the same function as ":INPut:DPOLarity" on page 131.

:IPOLarity:SSYNc

Supported E4438C with Option 001/601or 002/602

```
:ROUTe:HARDware:DGENerator:IPOLarity:SSYNc POSitive|NEGative
:ROUTe:HARDware:DGENerator:IPOLarity:SSYNc?
```

This command configures the polarity of the TTL input signal at the SYMBOL SYNC connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry **Symbol Sync Polarity Neg Pos**

Remarks This command performs the same function as ":INPut:SPOLarity" on page 131.

:OPOLarity:CLOCk

Supported E4438C with Option 001/601or 002/602

```
:ROUTe:HARDware:DGENerator:OPOLarity:CLOCk POSitive|NEGative
:ROUTe:HARDware:DGENerator:OPOLarity:CLOCk?
```

This command configures the polarity of the TTL output Data Clock Out signal at the DATA CLK OUT pin on the rear panel AUX I/O connector. POSitive refers to normal logic, while the NEGative refers to inverted logic.

***RST** POS

Key Entry **Data Clock Out Neg Pos**

Remarks This command performs the same function as ":OUTPut:CPOLarity" on page 134.

:OPOLarity:DATA

Supported E4438C with Option 001/601or 002/602

```
:ROUTe:HARDware:DGENerator:OPOLarity:DATA POSitive|NEGative
:ROUTe:HARDware:DGENerator:OPOLarity:DATA?
```

This command configures the polarity of the TTL output DATA OUT signal at the DATA OUT pin on the rear panel AUX I/O connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry **Data Out Polarity Neg Pos**

Remarks This command performs the same function as ":OUTPut:DPOLarity" on page 135.

:OPOLarity:SSYNc

Supported E4438C with Option 001/601or 002/602

`:ROUTe:HARDware:DGENerator:OPOLarity:SSYNc POSitive|NEGative`

`:ROUTe:HARDware:DGENerator:OPOLarity:SSYNc?`

This command configures the polarity of the TTL output SYMBOL SYNC signal at the SYM SYNC OUT pin on the rear panel AUX I/O connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry **Symbol Sync Out Polarity Neg Pos**

Remarks This command performs the same function as ":OUTPut:SPOLarity" on page 135.

:OUTPut:CPOLarity

Supported E4438C with Option 001/601or 002/602

`:ROUTe:HARDware:DGENerator:OUTPut:CPOLarity POSitive|NEGative`

`:ROUTe:HARDware:DGENerator:OUTPut:CPOLarity?`

This command configures the polarity of the TTL output DATA CLOCK OUT signal at the DATA CLK OUT pin on the rear panel AUX I/O connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry **Data Clock Polarity Neg Pos**

Remarks This command performs the same function as ":OPOLarity:CLOCk" on page 133.

:OUTPut:DCS[:STATe]

Supported E4438C with Option 001/601or 002/602

```
:ROUTe:HARDware:DGENerator:OUTPut:DCS[:STATe] ON|OFF|1|0
:ROUTe:HARDware:DGENerator:OUTPut:DCS[:STATe]?
```

This command is used to enable or disable the output DATA OUT, DATA CLK OUT, and SYM SYNC OUT signals from the rear panel AUX I/O connector. Normally, these output signals should be enabled (On). However, disabling these outputs will decrease the spurs that are sometimes present when operating at high symbol rates.

***RST** 1

Key Entry **DATA/CLK/SYNC Rear Outputs Off On**

:OUTPut:DPOLarity

Supported E4438C with Option 001/601or 002/602

```
:ROUTe:HARDware:DGENerator:OUTPut:DPOLarity POSitive|NEGative
:ROUTe:HARDware:DGENerator:OUTPut:DPOLarity?
```

This command configures the polarity of the TTL output signal at the DATA OUT connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry **Data Out Polarity Neg Pos**

Remarks This command performs the same function as ":OPOLarity:DATA" on page 133.

:OUTPut:SPOLarity

Supported E4438C with Option 001/601or 002/602

```
:ROUTe:HARDware:DGENerator:OUTPut:SPOLarity POSitive|NEGative
:ROUTe:HARDware:DGENerator:OUTPut:SPOLarity?
```

This command configures the polarity of the TTL input signal at the SYMBOL SYNC connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry **Symbol Sync Out Polarity Neg Pos**

Status Subsystem (:STATus)

:OPERation:BASeband:CONDition

Supported E4438C with Option 001/601or 002/602

`:STATus:OPERation:BASeband:CONDition?`

This query returns the decimal sum of the bits in the Baseband Operation Condition Register. For example, if the baseband is busy (bit 0), the value 1 is returned.

Range 0–32767

Remarks The data in this register is continuously updated and reflects the current conditions.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:OPERation:BASeband:ENABle

Supported E4438C with Option 001/601or 002/602

```
:STATus:OPERation:BASeband:ENABle <val>
:STATus:OPERation:BASeband:ENABle?
```

This command determines which bits in the Baseband Operation Event Register will set the Baseband is Busy bit (bit 10) in the Standard Operation Condition Register.

The variable `<num>` is the sum of the decimal values of the bits you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:OPERation:BASeband:NTRansition

Supported E4438C with Option 001/601or 002/602

```
:STATus:OPERation:BASeband:NTRansition <val>
:STATus:OPERation:BASeband:NTRansition?
```

This command determines which bits in the Baseband Operation Condition Register will set the corresponding bit in the Baseband Operation Event Register when that bit has a negative transition (1 to 0).

The variable `<val>` is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:OPERation:BASeband:PTRansition

Supported E4438C with Option 001/601or 002/602

```
:STATus:OPERation:BASeband:PTRansition <val>
:STATus:OPERation:BASeband:PTRansition?
```

This command determines which bits in the Baseband Operation Condition Register will set the corresponding bit in the Baseband Operation Event Register when that bit has a positive transition (0 to 1).

The variable `<val>` is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:OPERation:BASeband[:EVENt]

Supported E4438C with Option 001/601or 002/602

`:STATus:OPERation:BASeband[:EVENt]?`

CAUTION This is a destructive read. The data in the register is latched until it is queried. Once queried, the data is cleared.

This query returns the decimal sum of the bits in the Standard Operation Baseband Event Register.

Range 0–32767

Remarks The equivalent PTR and NTR filters must be set before the condition register can set the corresponding bit in the event register.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:OPERation:CONDition

Supported All

`:STATus:OPERation:CONDition?`

This query returns the decimal sum of the bits for the registers that are set to one and are part of the Standard Operation Status Group. For example, if a sweep is in progress (bit 3), the value 8 is returned.

Range 0–32767

Remarks The data in this register is continuously updated and reflects current conditions.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:OPERation:ENABle

Supported All

```
:STATus:OPERation:ENABle <val>
:STATus:OPERation:ENABle?
```

This command determines which bits in the Standard Operation Event Register will set the Standard Operation Status Summary bit (bit 7) in the Status Byte Register.

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:OPERation:NTRansition

Supported All

```
:STATus:OPERation:NTRansition <val>
:STATus:OPERation:NTRansition?
```

This command determines which bits in the Standard Operation Condition Register will set the corresponding bit in the Standard Operation Event Register when that bit has a negative transition (1 to 0).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:OPERation:PTRansition

Supported All

```
:STATus:OPERation:PTRansition <val>
:STATus:OPERation:PTRansition?
```

This command determines which bits in the Standard Operation Condition Register will set the corresponding bit in the Standard Operation Event Register when that bit has a positive transition (0 to 1).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:OPERation[:EVENt]

Supported All

CAUTION This is a destructive read. The data in the register is latched until it is queried. Once queried, the data is cleared.

```
:STATus:OPERation[:EVENt]?
```

This query returns the decimal sum of the bits in the Standard Operation Event Register.

Range 0–32767

Remarks The equivalent PTR or NTR filters must be set before the condition register can set the corresponding bit in the event register.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:PRESet

Supported All

```
:STATus:PRESet
```

This command presets all transition filters, enable registers, and error/event queue enable registers.

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:BERT:CONDition

Supported E4438C with Option UN7, 300 or both

```
:STATus:QUEStionable:BERT:CONDition?
```

This query returns the decimal sum of the bits in the Data Questionable BERT Condition Register. For example, if no clock signal has been input for more than three seconds during the bit error rate measurement (bit 0), then a value of 1 is returned.

Range 0–32767

Remarks The data in this register is continuously updated and reflects the current conditions.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:BERT:ENABle

Supported E4438C with Option UN7, 300 or both

```
:STATus:QUEStionable:BERT:ENABle <val>
:STATus:QUEStionable:BERT:ENABle?
```

This command determines which bits in the Data Questionable BERT Event Register will set the Data Questionable BERT Summary bit (bit 12) in the Data Questionable Condition Register.

The variable <val> is the sum of the decimal values of the bits you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:BERT:NTRansition

Supported E4438C with Option UN7, 300 or both

```
:STATus:QUEStionable:BERT:NTRansition <val>
:STATus:QUEStionable:BERT:NTRansition?
```

This command determines which bits in the Data Questionable BERT Condition Register will set the corresponding bit in the Data Questionable BERT Event Register when that bit has a negative transition (1 to 0).

The variable `<val>` is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks The data in this register is continuously updated and reflects the current conditions.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:BERT:PTRansition

Supported E4438C with Option UN7, 300 or both

```
:STATus:QUEStionable:BERT:PTRansition <val>
:STATus:QUEStionable:BERT:PTRansition?
```

This command determines which bits in the Data Questionable BERT Condition Register will set the corresponding bit in the Data Questionable BERT Event Register when that bit has a positive transition (0 to 1).

The variable `<val> is the sum of the decimal values of the bits that you want to enable.`

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:BERT[:EVENt]

Supported E4438C with Option UN7, 300 or both

CAUTION This is a destructive read. The data in the register is latched until it is queried. Once queried, the data is cleared.

```
:STATus:QUEStionable:BERT[:EVENt]?
```

This command returns the decimal value of the sum of the bits in the Data Questionable BERT Event Register.

Range 0–32767

Remarks Note that the register requires that the equivalent PTR or NTR filters be set before a condition register bit can set a bit in the Event register.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:CALibration:CONDition

Supported All

```
:STATus:QUEStionable:CALibration:CONDition?
```

This query returns the decimal sum of the bits in the Data Questionable Calibration Condition Register. For example, if the DCFM or DCΦM zero calibration fails (bit 0), a value of 1 is returned.

Range 0–32767

Remarks The data in this register is continuously updated and reflects the current conditions.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:CALibration:ENABle

Supported All

```
:STATus:QUEStionable:CALibration:ENABle <val>
:STATus:QUEStionable:CALibration:ENABle?
```

This command determines which bits in the Data Questionable Calibration Event Register will set the calibration summary bit (bit 8) in the Data Questionable Condition Register.

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:CALibration:NTRansition

Supported All

```
:STATus:QUEStionable:CALibration:NTRansition <val>
:STATus:QUEStionable:CALibration:NTRansition?
```

This command determines which bits in the Data Questionable Calibration Condition Register will set the corresponding bit in the Data Questionable Calibration Event Register when that bit has a negative transition (1 to 0).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:CALibration:PTRansition

Supported All

```
:STATus:QUEStionable:CALibration:PTRansition <val>
:STATus:QUEStionable:CALibration:PTRansition?
```

This command determines which bits in the Data Questionable Calibration Condition Register will set the corresponding bit in the Data Questionable Calibration Event Register when that bit has a positive transition (0 to 1).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:CALibration[:EVENt]

Supported All

CAUTION This is a destructive read. The data in the register is latched until it is queried. Once queried, the data is cleared.

`:STATus:QUEStionable:CALibration[:EVENt]?`

This command returns the decimal sum of the bits in the Data Questionable Calibration Event Register.

Range 0–32767

Remarks The equivalent PTR or NTR filters must be set before the condition register can set the corresponding bit in the event register.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:CONDition

Supported All

`:STATus:QUEStionable:CONDition?`

This query returns the decimal sum of the bits in the Data Questionable Condition Register. For example, if the reference oscillator oven is cold (bit 4), a value of 16 is returned.

Range 0–32767

Remarks The data in this register is continuously updated and reflects current conditions.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:ENABle

Supported All

```
:STATus:QUEStionable:ENABle <val>
:STATus:QUEStionable:ENABle?
```

This command determines which bits in the Data Questionable Event Register will set the Data Questionable Status Group Summary bit (bit 3) in the Status Byte Register.

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:FREQuency:CONDition

Supported All

```
:STATus:QUEStionable:FREQuency:CONDition?
```

This query returns the decimal sum of the bits in the Data Questionable Frequency Condition Register. For example, if the 1 GHz internal reference clock is unlocked (bit 2), a value of 4 is returned.

Range 0–32767

Remarks The data in this register is continuously updated and reflects current conditions.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:FREQuency:ENABle

Supported All

```
:STATus:QUEStionable:FREQuency:ENABle <val>
:STATus:QUEStionable:FREQuency:ENABle?
```

This command determines which bits in the Data Questionable Frequency Event Register will set the frequency summary bit (bit 5) in the Data Questionable Condition Register.

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:FREQuency:NTRansition

Supported All

```
:STATus:QUEStionable:FREQuency:NTRansition <val>
:STATus:QUEStionable:FREQuency:NTRansition?
```

This command determines which bits in the Data Questionable Frequency Condition Register will set the corresponding bit in the Data Questionable Frequency Event Register when that bit has a negative transition (1 to 0).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:FREQuency:PTRansition

Supported All

```
:STATus:QUEStionable:FREQuency:PTRansition <val>
:STATus:QUEStionable:FREQuency:PTRansition?
```

This command determines which bits in the Data Questionable Frequency Condition Register will set the corresponding bit in the Data Questionable Frequency Event Register when that bit has a positive transition (0 to 1).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:FREQuency[:EVENt]

Supported All

CAUTION This is a destructive read. The data in the register is latched until it is queried. Once queried, the data is cleared.

```
:STATus:QUEStionable:FREQuency[:EVENt]?
```

This query returns the decimal sum of the bits in the Data Questionable Frequency Event Register.

Range 0–32767

Remarks The equivalent PTR or NTR filters must be set before the condition register can set the corresponding bit in the event register.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:MODulation:CONDition

Supported All

```
:STATus:QUEStionable:MODulation:CONDition?
```

This command returns the decimal sum of the bits in the Data Questionable Modulation Condition Register. For example, if the modulation is uncalibrated (bit 4), a value of 16 is returned.

Range 0–32767

Remarks The data in this register is continuously updated and reflects current conditions.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:MODulation:ENABle

Supported All

```
:STATus:QUEStionable:MODulation:ENABle <val>
:STATus:QUEStionable:MODulation:ENABle?
```

This command determines which bits in the Data Questionable Modulation Event Register will set the modulation summary bit (bit 7) in the Data Questionable Condition Register.

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:MODulation:NTRansition

Supported All

```
:STATus:QUEStionable:MODulation:NTRansition <val>
:STATus:QUEStionable:MODulation:NTRansition?
```

This command determines which bits in the Data Questionable Modulation Condition Register will set the corresponding bit in the Data Questionable Modulation Event Register when that bit has a negative transition (1 to 0).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:MODulation:PTRansition

Supported All

```
:STATus:QUEStionable:MODulation:PTRansition <val>
:STATus:QUEStionable:MODulation:PTRansition?
```

This command determines which bits in the Data Questionable Modulation Condition Register will set the corresponding bit in the Data Questionable Modulation Event Register when that bit has a positive transition (0 to 1).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:MODulation[:EVENt]

Supported All

CAUTION This is a destructive read. The data in the register is latched until it is queried. Once queried, the data is cleared.

```
:STATus:QUEStionable:MODulation[:EVENt]?
```

This query returns the decimal sum of the bits in the Data Questionable Modulation Event Register.

Range 0–32767

Remarks The equivalent PTR or NTR filters must be set before the condition register can set the corresponding bit in the event register.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:NTRansition

Supported All

```
:STATus:QUEStionable:NTRansition <val>
:STATus:QUEStionable:NTRansition?
```

This command determines which bits in the Data Questionable Condition Register will set the corresponding bit in the Data Questionable Event Register when that bit has a negative transition (1 to 0).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:POWer:CONDition

Supported All

```
:STATus:QUEStionable:POWer:CONDition?
```

This query returns the decimal sum of the bits in the Data Questionable Power Condition Register. For example, if the RF output signal is unleveled (bit 1), a value of 2 is returned.

Range 0–32767

Remarks The data in this register is continuously updated and reflects current conditions.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:POWer:ENABle

Supported All

```
:STATus:QUEStionable:POWer:ENABle <val>
:STATus:QUEStionable:POWer:ENABle?
```

This command determines which bits in the Data Questionable Power Event Register will set the power summary bit (bit 3) in the Data Questionable Condition Register.

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:POWer:NTRansition

Supported All

```
:STATus:QUEStionable:POWer:NTRansition <val>
:STATus:QUEStionable:POWer:NTRansition?
```

This command determines which bits in the Data Questionable Power Condition Register will set the corresponding bit in the Data Questionable Power Event Register when that bit has a negative transition (1 to 0).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:POWer:PTRansition

Supported All

```
:STATus:QUEStionable:POWer:PTRansition <val>
:STATus:QUEStionable:POWer:PTRansition?
```

This command determines which bits in the Data Questionable Power Condition Register will set the corresponding bit in the Data Questionable Power Event Register when that bit has a positive transition (0 to 1).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:POWer[:EVENt]

Supported All

CAUTION This is a destructive read. The data in the register is latched until it is queried. Once queried, the data is cleared.

```
:STATus:QUEStionable:POWer[:EVENt]?
```

This query returns the decimal sum of the bits in the Data Questionable Power Event Register.

Range 0–32767

Remarks The equivalent PTR or NTR filters must be set before the condition register can set the corresponding bit in the event register.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable:PTRansition

Supported All

```
:STATus:QUEStionable:PTRansition <val>
:STATus:QUEStionable:PTRansition?
```

This command determines which bits in the Data Questionable Condition Register will set the corresponding bit in the Data Questionable Event Register when that bit has a positive transition (0 to 1).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable[:EVENt]

Supported All

CAUTION This is a destructive read. The data in the register is latched until it is queried. Once queried, the data is cleared.

`:STATus:QUEStionable[:EVENt]?`

This query returns the decimal sum of the bits in the Data Questionable Event Register.

Range 0–32767

Remarks The equivalent PTR or NTR filters must be set before the condition register can set the corresponding bit in the event register.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

System Subsystem (:SYSTem)

:CAPability

Supported All

```
:SYSTem:CAPability?
```

This query returns the signal generator’s capabilities and outputs the appropriate specifiers:

```
(RFSOURCE WITH((AM|FM|PULM|PM|LFO)&(FSSWEEP|FLIST)&(PSSWEEP|PLIST)
&TRIGGER&REFERENCE))
```

This is a list of the SCPI-defined basic functionality of the signal generator and the additional capabilities it has in parallel (a&b) and singularly (a|b).

:DATE

Supported All

```
:SYSTem:DATE <year>,<month>,<day>
:SYSTem:DATE?
```

This command sets the date as shown in the lower right area of the signal generator display.

<year> This variable requires a four digit integer.

The query returns the date in the following format:

<+year>, <+month>, <+day>

Range <month>: 1–12 <day>: 1–31

Key Entry **Time/Date**

:ERRor[:NEXT]

Supported All

```
:SYSTem:ERRor[:NEXT]?
```

This query returns the most recent error message from the signal generator error queue. If there are no error messages, the query returns the following output:

```
+0,"No error"
```

When there is more than one error message, the query will need to be sent for each message.

Key Entry **Error Info** **View Next Error Message**

Remarks The ESG deletes the error messages after viewing the last message.

:ERRor:SCPI[:SYNTax]

Supported All

```
:SYSTem:ERRor:SCPI[:SYNTax] ON|OFF|1|0
:SYSTem:ERRor:SCPI[:SYNTax]?
```

This command enables or disables the reporting of SCPI syntax errors to the error queue. The query returns only the numeric value of 1 or 0.

***RST** 0

Remarks The setting ON/1 is persistent through preset and *RST. This setting will not survive a power cycle.

:FILEsystem:SAFEmode

Supported All

```
:SYSTem:FILEsystem:SAFEmode ON|OFF|1|0
:SYSTem:FILEsystem:SAFEmode?
```

This command selects the safe mode for file handling. When safe mode is set to `OFF`, volatile waveform files can be edited and saved while the signal generator plays the file without signal interruption. However, it is possible with complex waveforms, for corruption of memory to occur which will be reported as an error on the front-panel display and require a reboot of the signal generator to resolve.

Example

```
:SYST:FILE:SAVE ON
```

The preceding example enables the safe mode setting and waveform files cannot be edited without signal disruption while the signal generator plays them.

***RST** On

:HELP:MODE

Supported All

```
:SYSTem:HELP:MODE SINGle|CONTinuous
:SYSTem:HELP:MODE?
```

This command sets the help function mode of the signal generator.

SINGle Help is provided only for the next key that you press.

CONTinuous Help is provided for each key you press. In addition, the function of the key is executed.

When the help dialog box is displayed, pressing the **Help** hardkey in either mode will turn help off.

Key Entry **Help Mode Single Cont**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

:IDN

Supported All

```
:SYSTem:IDN "<string>"
```

This command modifies the identification string that the `*IDN?` query returns. Sending an empty string returns the query output of `*IDN?` to its factory shipped setting. The maximum string length is 72 characters.

Remarks Modification of the *IDN? query output enables the signal generator to identify itself as another signal generator when used as a replacement.

The display diagnostic information, shown by pressing the **Diagnostic Info** softkey, is not affected by this command.

:LANGuage

Supported All

```
:SYSTem:LANGuage "SCPI"|"COMP"|"NADC"|"PDC"|"PHS"|"8648"
:SYSTem:LANGuage?
```

This command sets the remote language for the signal generator.

SCPI	This choice provides compatibility for SCPI commands.
COMP	This choice provides compatibility for the 8656B, 8657A/B signal generator which is supported by using the GPIB interface.
NADC	This choice provides compatibility for the 8657D NADC personality which is supported only through a GPIB interface (E4438C only).
PDC	This choice provides compatibility for the 8657D PDC personality which is supported only through a GPIB interface (E4438C only).
PHS	This choice provides compatibility for the 8657J PHS personality which is supported only through a GPIB interface (E4438C only).
8648	This choice provides compatibility for the 8648A/B/C/D signal generator which is supported only through a GPIB interface.

Key Entry **SCPI** **8656B,8657A/B** **8657D NADC** **8657D PDC** **8657J PHS** **8648A/B/C/D**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

For more information on supported SCPI commands and programming codes, refer to the *Programming Compatibility Guide*.

:LICense:EXTernal:LIST

Supported All

`:SYSTem:LICense:EXTernal:LIST?`

This query provides a listing of the current licenses for external software installed on the signal generator.

:OPT

Supported All

`:SYSTem:OPT "<string>"`

This command modifies the option string that the `*OPT?` query returns. Sending an empty string sets the query output of `*OPT?` to the signal generator’s factory shipped setting. The maximum string length is 72 characters.

Remarks Modification of the *OPT? query output enables the signal generator, with a set of options, to *identify* itself as another signal generator when used as a replacement

The display diagnostic information, shown by pressing the **Diagnostic Info** softkey, is not affected by this command.

:PON:TYPE

Supported All

`:SYSTem:PON:TYPE PRESet|LAST`

`:SYSTem:PON:TYPE?`

This command sets the defined conditions for the signal generator at power on.

PRESet This choice sets the conditions to factory- or user-defined as determined by the choice for the preset type. Refer to ":PRESet:TYPE" on page 160 for selecting the type of preset.

LAST This choice retains the settings at the time the signal generator was last powered down.

NOTE When LAST is selected, no signal generator interaction can occur for at least 3 seconds prior to cycling the power for the current settings to be saved.

Key Entry **Power On Last Preset**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

:PRESet

Supported All

`SYSTem:PRESet`

This command returns the signal generator to a set of defined conditions. It is equivalent to pressing the front panel **Preset** hardkey.

Key Entry **Preset**

Remarks The defined conditions are either factory- or user-defined. Refer to ":PRESet:TYPE" on page 160 for selecting the type of defined conditions.

:PRESet:ALL

Supported All

`:SYSTem:PRESet:ALL`

This command sets all states of the signal generator back to their factory default settings, including states that are not normally affected by signal generator power-on, preset, or `*RST`.

:PRESet:LANGuage

Supported All

```
:SYSTem:PRESet:LANGuage"SCPI"|"COMP"|"NADC"|"PDC"|"PHS"|"8648"
:SYSTem:PRESet:LANGuage?
```

This command sets the remote language that is available when the signal generator is preset.

SCPI This choice provides compatibility for SCPI commands.

COMP This choice provides compatibility for the 8656B, 8657A/B signal generator which is supported by using the GPIB interface.

NADC This choice provides compatibility for the 8657D NADC personality which is supported only through a GPIB interface (E4438C only).

PDC This choice provides compatibility for the 8657D PDC personality which is supported only through a GPIB interface (E4438C only).

PHS This choice provides compatibility for the 8657J PHS personality which is supported only through a GPIB interface (E4438C only).

8648 This choice provides compatibility for the 8648A/B/C/D signal generator which is supported only through a GPIB interface.

***RST** "SCPI"

Key Entry **SCPI** **8656B,8657A/B** **8657D NADC** **8657D PDC** **8657J PHS** **8648A/B/C/D**

:PRESet:PERSistent

Supported All

```
:SYSTem:PRESet:PERSistent
```

This command sets the states that are not affected by signal generator power-on, preset, or `*RST` to their factory default settings.

Key Entry **Restore Sys Defaults**

:PRESet:PN9

Supported E4438C Option with Option 001/601or 002/602

```
:SYSTem:PRESet:PN9 NORMal|QUICk
:SYSTem:PRESet:PN9?
```

This command sets the preset length of the PN9 sequence for personalities that require software PRBS generation.

NORMal	This choice produces a maximal length PN9 sequence.
QUICk	This choice produces a truncated (216 bits) PN9 sequence.
***RST**	NORM
Key Entry	**PN9 Mode Preset**

:PRESet:TYPE

Supported All

```
:SYSTem:PRESet:TYPE NORMal|USER
:SYSTem:PRESet:TYPE?
```

This command toggles the preset state between factory- and user-defined conditions.

Key Entry **Preset Normal User**

Remarks Refer to ":PRESet[:USER]:SAVE" for saving the USER choice preset settings.

The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

:PRESet[:USER]:SAVE

Supported All

```
:SYSTem:PRESet[:USER]:SAVE
```

This command saves your user-defined preset conditions to a state file.

Key Entry **Save User Preset**

Remarks Only one user-defined preset file can be saved. Subsequent saved user-defined preset files will overwrite the previously saved file.

:SECurity:DISPlay

Supported All Models

```
:SYSTem:SECurity:DISPlay ON|OFF|1|0
:SYSTem:SECurity:DISPlay?
```

This command enables or disables the secure display mode.

On(1) This selection turns the signal generator display back on, showing the current settings. Cycling the signal generator power also restores the display, however the current settings may change depending on the power-on configuration choice. See ":PON:TYPE" on page 158 for information on the power-on choices available.

OFF(0)	This selection blanks the signal generator's display, hiding the settings and disabling the front panel keys. While in this mode, the display shows `*** SECURE DISPLAY ACTIVATED ***`.

For more information about security functions, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

Example

```
:SYST:SEC:DISP OFF
```

The preceding example enables the secure display mode.

***RST**	1
Range	N/A
Key Entry	**Activate Security Display**

:SECurity:ERASeall

Supported All Models

```
:SYSTem:SECurity:ERASall
```

This command removes all user files, flatness correction files, and baseband generator files. In addition, all table editor files are returned to their original factory values.

This command differs from the :DELete:ALL command, which does not reset table editors to factory values. For more information about security functions, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

Key Entry **Erase All**

:SECurity:LEVel

Supported All Models

```
:SYSTem:SECurity:LEVel NONE|ERASe|OVERwrite|SANitize
:SYSTem:SECurity:LEVel?
```

This command selects the security level operation for the signal generator.

NONE	This selection causes the signal generator to reset to factory default settings.
ERASe	This selection removes all user files, table editor files, flatness correction files, and baseband generator files.
OVERwrite	This selection removes all user files, table editor files, flatness correction files,

and baseband generator files. The memory is then overwritten with random data.

SRAM	All addressable locations will be overwritten with random characters.
Hard Disk	All addressable locations will be overwritten with random characters.
Flash Memory	The flash blocks will be erased.

SANitize — This selection removes all user files, table editor files, flatness correction files, and baseband generator files using the same techniques as the OVERwrite selection for SRAM and flash memory. For the hard disk, the signal generator overwrites all addressable locations with a single character, its complement, and then with a random character.

Once you select the security level, you must execute the command from ":SECurity:LEVel:STATe" to arm the security level.

NOTE Once you select a security level and arm it, you cannot change the level.

For other cleaning and security operation descriptions, see ":SECurity:ERASeall" on page 161, ":SECurity:OVERwrite" on page 163, and ":SECurity:SANitize" on page 163. For more information about security functions, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

Example

```
:SYST:SEC:LEV NONE
```

The preceding example sets the secure mode so it resets the signal generator to factory settings after completing the security operation.

Key Entry **None** **Erase** **Overwrite** **Sanitize**

:SECurity:LEVel:STATe

Supported All Models

CAUTION Ensure that you select the security level prior to executing this command with the ON (1) selection. Once you enable the state, you cannot reduce the security level.

```
:SYSTem:SECurity:LEVel:STATe ON|OFF|1|0
:SYSTem:SECurity:LEVel:STATe?
```

This command arms and executes the current security level parameter.

On (1) This selection arms and prevents any changes to the current security level. Refer

to ":SECurity:LEVel" on page 161 for setting the security level.

OFF (0)	This selection performs the actions required for the current security level setting. Cycling the signal generator power also performs the same function.

For more information about security functions, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

Example

```
:SYST:SEC:LEV:STAT ON
```

The preceding example arms the secure mode selected with the SYSTem:SECurity:LEVel command.

Key Entry **Enter Secure Mode**

:SECurity:OVERwrite

Supported All Models

```
:SYSTem:SECurity:OVERwrite
```

This command removes all user files, table editor files values, flatness correction files, and baseband generator files. The memory is then overwritten with random data as described below. For more information about security functions, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

SRAM	All addressable locations will be overwritten with random characters.
HARD DISK	All addressable locations will be overwritten with random characters.
FLASH MEMORY	The flash blocks will be erased.

Key Entry **Erase and Overwrite All**

:SECurity:SANitize

Supported All Models

```
:SYSTem:SECurity:SANitize
```

This command removes all user files, table editor files values, flatness correction files, and baseband generator files. The memory is then overwritten with a sequence of data as described below. For more information about security functions, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

SRAM	All addressable locations will be overwritten with random characters.
HARD DISK	All addressable locations will be overwritten with a single character and then a random character.
FLASH MEMORY	The flash blocks will be erased.

Key Entry **Erase and Sanitize All**

:SSAVer:DELay

Supported All

```
:SYSTem:SSAVer:DELay <val>
:SYSTem:SSAVer:DELay?
```

This command sets the amount of time before the display light or display light and text is switched off. This will occur if there is no input via the front panel during the delay period.

The variable `<val>` is a whole number measured in hours.

Range 1–12

Key Entry **Screen Saver Delay:**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

Refer to ":SSAVer:MODE" on page 164 for selecting the screen saver mode.

:SSAVer:MODE

Supported All

```
:SYSTem:SSAVer:MODE LIGHt|TEXT
:SYSTem:SSAVer:MODE?
```

This command toggles the screen saver mode between light only or light and text.

LIGHt This choice enables only the light to turn off during the screen saver operation while leaving the text visible on the darkened screen.

TEXT This choice enables both the display light and text to turn off during the screen saver operation.

Key Entry **Screen Saver Mode**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

:SSAVer:STATe

Supported All

```
:SYSTem:SSAVer:STATe ON|OFF|1|0
:SYSTem:SSAVer:STATe?
```

This command enables or disables the display screen saver.

Key Entry **Screen Saver Off On**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

:TIME

Supported All

```
:SYSTem:TIME <hour>,<minute>,<second>
:SYSTem:TIME?
```

This command sets the time displayed in the lower right area of the signal generator's display.

Range <hour>: 0–23 <minute>: 0–59 <second>: 0–59

Key Entry **Time/Date**

:VERSion

Supported All

```
:SYSTem:VERSion?
```

This command returns the SCPI version number with which the signal generator complies.

Trigger Subsystem

:ABORt

Supported All

`:ABORt`

This command causes the List or Step sweep in progress to abort. If `INIT:CONT[:ALL]` is set to ON, the sweep will immediately re-initiate. The pending operation flag affecting `*OPC`, *OPC?, and `*WAI` will undergo a transition once the sweep has been reset.

:INITiate:CONTinuous[:ALL]

Supported All

`:INITiate:CONTinuous[:ALL] ON|OFF|1|0`
`:INITiate:CONTinuous[:ALL]?`

This command selects either a continuous or single list or step sweep. Execution of this command does not affect a sweep in progress.

ON (1)	This choice selects continuous sweep where, after the completion of the previous sweep, the current sweep will restart automatically or wait until the appropriate trigger source is received.
OFF (0)	This choice selects a single sweep. Refer to ":INITiate[:IMMediate][:ALL]" on page 167 for single sweep triggering information.
***RST**	0
Key Entry	**Sweep Repeat Single Cont**
Remarks	Execution of this command will not affect a sweep in progress.

:INITiate[:IMMediate][:ALL]

Supported All

```
:INITiate[:IMMediate][:ALL]
```

This command either sets or sets and starts a single List or Step sweep, depending on the trigger type. The command performs the following:

- arms a single sweep when BUS, EXTernal, or KEY is the trigger source selection
- arms and starts a single sweep when IMMediate is the trigger source selection

This command is ignored if a sweep is in progress. See ":INITiate:CONTinuous[:ALL]" on page 166 for setting continuous or single sweep. See ":TRIGger[:SEQuence]:SOURce" on page 168 to select the trigger source.

In some atypical cases, the `:INIT` command could be ignored if it immediately follows an `*OPC?` command. If the `:INIT` command is ignored, then use a 10ms sleep function before sending the command.

Key Entry **Single Sweep**

:TRIGger:OUTPut:POLarity

Supported All

```
:TRIGger:OUTPut:POLarity POSitive|NEGative
:TRIGger:OUTPut:POLarity?
```

Sets the TTL signal level present at the TRIGGER OUT connector to either high (5 vdc) or low (0 vdc). The trigger out is asserted after the frequency and/or power is set while the sweep is waiting for its step trigger. In addition, the swept-sine sends a pulse to the TRIGGER OUT at the beginning of each sweep.

Example

```
:TRIG:OUTP:POL NEG
```

The preceding example enables the continuos mode as the sweep type.

***RST** POS

Key Entry **Trigger Out Polarity Neg Pos**

:TRIGger[:SEQuence]:SLOPe

Supported All

```
:TRIGger[:SEQuence]:SLOPe POSitive|NEGative
:TRIGger[:SEQuence]:SLOPe?
```

This command sets the polarity of the ramp or sawtooth waveform slope present at the TRIG IN connector that will trigger a list or step sweep.

***RST** POS

Key Entry **Trigger In Polarity Neg Pos**

:TRIGger[:SEQuence]:SOURce

Supported All

```
:TRIGger[:SEQuence]:SOURce BUS|IMMediate|EXTernal|KEY
:TRIGger[:SEQuence]:SOURce?
```

This command sets the sweep trigger source for a list or step sweep.

BUS	This choice enables GPIB triggering using the `*TRG` or `GET` command or LAN and RS-232 triggering using the `*TRG` command.
IMMediate	This choice enables immediate triggering of the sweep event.
EXTernal	This choice enables the triggering of a sweep event by an externally applied signal at the TRIG IN connector.
KEY	This choice enables triggering through front panel interaction by pressing the **Trigger** hardkey.

***RST** IMM

Remarks The wait for the BUS, EXTernal, or KEY trigger can be bypassed by sending the `:TRIGger[:SEQuence][:IMMediate]` command.

Example

```
:TRIG:SOUR BUS
```

The preceding example sets the sweep trigger source to BUS.

***RST** IMM

Key Entry **Bus** **Free Run** **Ext** **Trigger Key**

:TRIGger[:SEQuence][:IMMediate]

Supported All Models

`:TRIGger[:SEQuence][:IMMediate]`

This event command causes an armed List or Step sweep to immediately start without the selected trigger occurring.

In some atypical cases, the `:TRIG` command could be ignored if it immediately follows an `*OPC?` command. If the `:TRIG` command is ignored, then use a 10ms sleep function before sending the command.

Unit Subsystem (:UNIT)

:POWer

Supported All

```
:UNIT:POWer DBM|DBUV|DBUVEMF|V|VEMF|DB
:UNIT:POWer?
```

This command terminates an amplitude value in the selected unit of measure.

If the amplitude reference state is set to on, the query returns units expressed in DB and the DB choice will be displayed. Setting any other unit will cause a setting conflict error stating that the amplitude reference state must be set to off. Refer to, ":REFerence:STATe" on page 67 for more information.

***RST** DBM

Key Entry **dBm** **dBuV** **dBuVemf** **mV** **uV** **mVemf** **uVemf** **DB**

Remarks All power values in this chapter are shown with DBM as the unit of measure. If a different unit of measure is selected, replace DBM with the newly selected unit whenever it is indicated for the value.

4 Analog Commands

This chapter provides SCPI descriptions for subsystems dedicated to analog commands common to all ESG signal generator models. This chapter contains the following major sections:

Amplitude Modulation Subsystem ([:SOURce])

:AM[1]|2...

Supported All Models

```
[:SOURce]:AM[1]|2...
```

This prefix enables the selection of the AM path and is part of most SCPI commands associated with this subsystem. The two paths are equivalent to the **AM Path 1 2** softkey.

AM[1]	**AM Path 1 2** with 1 selected
AM2	**AM Path 1 2** with 2 selected

When just AM is shown in a command, this means the command applies globally to both paths.

Each path is set up separately. When a SCPI command uses AM[1], only path one is affected. Consequently, when AM2 is selected, only path two is set up. However, the depth of the signals for the two paths can be coupled.

Depth coupling links the depth value of AM[1] to AM2. Changing the deviation value for one path will change it for the other path.

These two paths can be on at the same time provided the following conditions have been met:

- DUALsine or SWEPtsine is not the selection for the waveform type
- each path uses a different source (Internal 1, Ext1, or Ext2)

:AM:INTernal:FREQuency:STEP[:INCRement]

Supported All Models

```
[:SOURce]:AM:INTernal:FREQuency:STEP[:INCRement] <num>
[:SOURce]:AM:INTernal:FREQuency:STEP[:INCRement]?
```

This command sets the step increment for the amplitude modulation internal frequency.

The variable <num> is expressed in units of Hertz.

Range 0.5–1E6

Key Entry **Incr Set**

Remarks The value set by this command is used with the UP and DOWN choices for the AM frequency setting. Refer to “:AM[1]|2:INTernal[1]:FREQuency” on page 174 for more information.

The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:AM:WIDeband:STATe

Supported All Models

```
[:SOURce]:AM:WIDeband:STATe ON|OFF|1|0
[:SOURce]:AM:WIDeband:STATe?
```

This command enables or disables the wideband amplitude modulation for the selected path.

***RST** 0

Key Entry **AM Off On**

Remarks The RF carrier is modulated when the modulation state of the signal generator is set to ON, see “:MODulation[:STATe]” on page 129 for more information.

Whenever amplitude modulation is enabled, the AM annunciator is turned on in the display

:AM[1]|2:EXTernal[1]|2:COUPling

Supported All Models

```
[:SOURce]:AM[1]|2:EXTernal[1]|2:COUPling AC|DC
[:SOURce]:AM[1]|2:EXTernal[1]|2:COUPling?
```

This command sets the coupling for the amplitude modulation source through the selected external input connector.

AC This choice will only pass ac signal components.

DC This choice will pass both ac and dc signal components.

***RST** DC

Key Entry **Ext Coupling DC AC**

Remarks The command does not change the currently active source or switch the current modulation on or off. The modulating signal may be the sum of several signals, either internal or external sources.

:AM[1]|2:INTernal[1]:FREQuency

Supported All Models

```
[:SOURce]:AM[1]|2:INTernal[1]:FREQuency <val><unit>|UP|DOWN
[:SOURce]:AM[1]|2:INTernal[1]:FREQuency?
```

This command sets the internal amplitude modulation rate for the following applications:

- the first tone of a dual-sine waveform
- the start frequency for a swept-sine waveform
- the frequency rate for all other waveforms

***RST** +4.00000000E+002

Range Dual Sine, Swept-Sine & Sine: 0.1HZ–100kHZ

All Other Waveforms: 0.1HZ–20kHZ

Key Entry **AM Tone 1 Rate** **AM Start Rate** **AM Rate**

:AM[1]|2:INTernal[1]:FREQuency:ALTernate

Supported All Models

```
[:SOURce]:AM[1]|2:INTernal[1]:FREQuency:ALTernate <val><unit>
[:SOURce]:AM[1]|2:INTernal[1]:FREQuency:ALTernate?
```

This command sets the frequency for the alternate signal.

***RST** +4.00000000E+002

Range Dual-Sine: 0.1HZ–100kHZ Swept-Sine: 0.1HZ–100kHZ

Key Entry **AM Tone 2 Rate** **AM Stop Rate**

Remarks The alternate signal frequency is the second tone of a dual-sine or the stop frequency of a swept-sine waveform.

Refer to “:AM[1]|2:INTernal[1]:FUNCtion:SHAPe” on page 175 for the waveform selection.

:AM[1]|2:INTernal[1]:FREQuency:ALTernate:AMPLitude:PERCent

Supported All Models

```
[:SOURce]:AM[1]|2:INTernal[1]:FREQuency:ALTernate:AMPLitude:
PERCent <val><unit>
[:SOURce]:AM[1]|2:INTernal[1]:FREQuency:ALTernate:AMPLitude:PERCent?
```

This command sets the amplitude of the second tone for a dual-sine waveform as a percentage of the total amplitude. For example, if the second tone makes up 30% of the total amplitude, then the first tone is 70% of the total amplitude.

***RST** +5.00000000E+001

Range 0–100PCT

Key Entry **AM Tone 2 Ampl Percent Of Peak**

Remarks Refer to ":AM[1]|2:INTernal[1]:FUNCtion:SHAPe" on page 175 for the waveform selection.

:AM[1]|2:INTernal[1]:FUNCtion:SHAPe

Supported All Models

```
[:SOURce]:AM[1]|2:INTernal[1]:FUNCtion:SHAPe SINE|TRIangle|SQUare|RAMP|
NOISe|DUALsine|SWEPtsine
[:SOURce]:AM[1]|2:INTernal[1]:FUNCtion:SHAPe?
```

This command sets the AM waveform type.

***RST** SINE

Key Entry **Sine** **Triangle** **Square** **Ramp** **Noise** **Dual-Sine** **Swept-Sine**

:AM[1]|2:INTernal[1]:SWEep:TIME

Supported All Models

```
[:SOURce]:AM[1]|2:INTernal[1]:SWEep:TIME <val><unit>
[:SOURce]:AM[1]|2:INTernal[1]:SWEep:TIME?
```

This command sets the sweep rate for the amplitude-modulated, swept-sine waveform.

***RST** +1.00000000E–001

Range 1mS–65.535S

Key Entry **AM Sweep Time**

:AM[1]|2:INTernal[1]:SWEep:TRIGger

Supported All Models

```
[:SOURce]:AM[1]|2:INTernal[1]:SWEep:TRIGger BUS|IMMediate|EXTernal|KEY
[:SOURce]:AM[1]|2:INTernal[1]:SWEep:TRIGger?
```

This command sets the trigger source for the amplitude modulated swept-sine waveform.

BUS This choice enables GPIB triggering using the `*TRG` or `GET` command or LAN and RS-232 triggering using the `*TRG` command.

IMMediate This choice enables immediate triggering of the sweep event.

EXTernal This choice enables the triggering of a sweep event by an externally applied signal at the TRIG IN connector.

KEY This choice enables triggering through front panel interaction by pressing the **Trigger** hardkey.

***RST** IMM

Key Entry **Bus** **Free Run** **Ext** **Trigger Key**

Remarks Refer to ":AM[1]|2:INTernal[1]:FUNCtion:SHAPe" on page 175 for the waveform selection.

:AM[1]|2:SOURce

Supported All Models

```
[:SOURce]:AM[1]|2:SOURce INT[1]|EXT[1]|EXT2
[:SOURce]:AM[1]|2:SOURce?
```

This command sets the source to generate the amplitude modulation.

INT This choice selects the internal source to provide an ac-coupled signal.

EXT This choice selects the EXT 1 INPUT or the EXT 2 INPUT connector to provide an externally applied signal that can be ac- or dc-coupled.

***RST** INT

Key Entry **Internal** **Ext1** **Ext2**

Remarks A 1.0 V_p input is required for calibrated AM depth settings.

The externally applied, ac-coupled input signal is tested for a voltage level and a display annunciator will report a high or low condition if that voltage is > ±3% of 1 V_p.

:AM[1]|2:STATe

Supported All Models

```
[:SOURce]:AM[1]|2:STATe ON|OFF|1|0
[:SOURce]:AM[1]|2:STATe?
```

This command enables or disables the amplitude modulation for the selected path.

***RST** 0

Key Entry **AM Off On**

Remarks The RF carrier is modulated when you have set the signal generator's modulation state to ON, see ":MODulation[:STATe]" on page 129 for more information.

Whenever amplitude modulation is enabled, the `AM` annunciator is turned on in the display.

The two paths for amplitude modulation can be simultaneously enabled. Refer to ":AM[1]|2..." on page 172 for more information.

:AM[1]|2[:DEPTh]

Supported All Models

```
[:SOURce]:AM[1]|2[:DEPTh][:LINear] <val><unit>|UP|DOWN
[:SOURce]:AM[1]|2[:DEPTh][:LINear]?
```

This commands sets the amplitude modulation depth in percent.

***RST** +1.00000000E–001

Range 0.00–100PCT

Key Entry **AM Depth**

Remarks The value of AM depth applies only to whichever AM path configuration (AM[1]|2) you have currently selected. AM Depth is fixed for wideband AM.

When the depth values are coupled, a change made to one path is applied to both. Refer to ":AM[1]|2[:DEPTh]:TRACk" on page 178 for AM depth value coupling.

Refer to ":AM[:DEPTh]:STEP[:INCRement]" on page 178 for setting the value associated with UP and DOWN choices.

:AM[1]|2[:DEPTh]:TRACk

Supported All Models

```
[:SOURce]:AM[1]|2[:DEPTh][:LINear]:TRACk ON|OFF|1|0
[:SOURce]:AM[1]|2[:DEPTh][LINear]:TRACk?
```

This command enables or disables the coupling of the AM depth values between the paths (AM[1] and AM2).

ON (1) This choice will link the depth value of AM[1] with AM2; AM2 will assume the AM[1] depth value. For example, if AM[1] depth is set to 15% and AM2 is set to 11%, enabling the depth tracking will cause the AM2 depth value to change to 15%. This applies regardless of the path (AM[1] or AM2) selected in this command

OFF (0) This choice disables the coupling and both paths will have independent depth values.

***RST** 0

Key Entry **AM Depth Couple Off On**

Remarks When the depth values are coupled, a change made to one path is applied both.

:AM[:DEPTh]:STEP[:INCRement]

Supported All Models

```
[:SOURce]:AM[:DEPTh]:STEP[:INCRement] <val><unit>
[:SOURce]:AM[:DEPTh]:STEP[:INCRement]?
```

This command sets the AM depth step increment.

Range 0.1–100PCT

Key Entry **Incr Set**

Remarks The value set by this command is used with the UP and DOWN choices for the AM depth setting. Refer to ":AM[1]|2[:DEPTh]" on page 177 for more information.

The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

Frequency Modulation Subsystem ([:SOURce])

:FM[1]|2...

Supported All Models

`[:SOURce]:FM[1]|2...`

This prefix enables the selection of the FM path and is part of most SCPI commands associated with this subsystem. The two paths are equivalent to the **FM Path 1 2** softkey.

FM[1]	**FM Path 1 2** with 1 selected
FM2	**FM Path 1 2** with 2 selected

When just FM is shown in a command, this means the command applies globally to both paths.

Each path is set up separately. When a SCPI command uses FM[1], only path one is affected. Consequently, when FM2 is selected, only path two is set up. However, the deviation of the signals for the two paths can be coupled.

Deviation coupling links the deviation value of FM[1] to FM2. Changing the deviation value for one path will change it for the other path.

These two paths can be on at the same time provided the following conditions have been met:

- DUALsine or SWEPtsine is not the selection for the waveform type
- each path uses a different source (Internal 1, Ext1, or Ext2)
- FM2 must be set to a deviation less than FM[1]

:FM:INTernal:FREQuency:STEP[:INCRement]

Supported All Models

```
[:SOURce]:FM:INTernal:FREQuency:STEP[:INCRement] <num>
[:SOURce]:FM:INTernal:FREQuency:STEP[:INCRement]?
```

This command sets the step increment for the internal frequency modulation.

The variable <num> sets the entered value in units of Hertz.

***RST** +5.00000000E+002

Range 0.5–1E6

Key Entry **Incr Set**

Remarks The value set by this command is used with the UP and DOWN choices for the FM frequency setting. Refer to ":FM[1]|2:INTernal[1]:FREQuency" on page 181 for more information.

The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

:FM[1]|2:EXTernal[1]|2:COUPLing

Supported All Models

```
[:SOURce]:FM[1]|2:EXTernal[1]|2:COUPling AC|DC
[:SOURce]:FM[1]|2:EXTernal[1]|2:COUPling?
```

This command sets the coupling for the frequency modulation source through the selected external input connector.

AC This choice will only pass ac signal components.

DC This choice will pass both ac and dc signal components.

***RST** DC

Key Entry **Ext Coupling DC AC**

Remarks The command does not change the currently active source or switch the current modulation on or off. The modulating signal may be the sum of several signals, either internal or external sources.

:FM[1]|2:INTernal[1]:FREQuency

Supported All Models

```
[:SOURce]:FM[1]|2:INTernal[1]:FREQuency <val><unit>|UP|DOWN
[:SOURce]:FM[1]|2:INTernal[1]:FREQuency?
```

This command sets the internal frequency modulation rate for the following applications:

- the first tone of a dual-sine waveform
- the start frequency for a swept-sine waveform
- the frequency rate for all other waveforms

***RST** +4.00000000E+002

Range Dual-Sine: 0.1HZ–100KHZ Swept-Sine: 0.1HZ–100KHZ

All Other Waveforms: 0.1HZ–20KHZ

Key Entry **FM Tone 1 Rate** **FM Start Rate** **FM Rate**

:FM[1]|2:INTernal[1]:FREQuency:ALTernate

Supported All Models

```
[:SOURce]:FM[1]|2:INTernal[1]:FREQuency:ALTernate <val><unit>
[:SOURce]:FM[1]|2:INTernal[1]:FREQuency:ALTernate?
```

This command sets the frequency for the alternate signal.

***RST** +4.00000000E+002

Range Dual-Sine: 0.5HZ–1MHZ Swept-Sine: 1HZ–1MHZ

Key Entry **FM Tone 2 Rate** **FM Stop Rate**

Remarks The alternate signal frequency is the second tone of a dual-sine or the stop frequency of a swept-sine waveform.

Refer to “:FM[1]|2:INTernal[1]:FUNCtion:SHAPe” on page 182 for the waveform selection.

:FM[1]|2:INTernal[1]:FREQuency:ALTernate:AMPLitude:PERCent

Supported All Models

```
[:SOURce]:FM[1]|2:INTernal[1]:FREQuency:ALTernate:AMPLitude:
PERCent <val><unit>
[:SOURce]:FM[1]|2:INTernal[1]:FREQuency:ALTernate:AMPLitude:PERCent?
```

This command sets the amplitude of the second tone for a dual-sine waveform as a percentage of the total amplitude. For example, if the second tone makes up 30% of the total amplitude, then the first tone is 70% of the total amplitude.

***RST** +1.00000000E+002

Range 0–100PCT

Key Entry **FM Tone 2 Ampl Percent Of Peak**

Remarks Refer to ":FM[1]|2:INTernal[1]:FUNCtion:SHAPe" for the waveform selection.

:FM[1]|2:INTernal[1]:FUNCtion:SHAPe

Supported All Models

```
[:SOURce]:FM[1]|2:INTernal[1]|:FUNCtion:SHAPe SINE|TRIangle|SQUare|RAMP|
NOISe|DUALsine|SWEPtsine
[:SOURce]:FM[1]|2:INTernal[1]|:FUNCtion:SHAPe?
```

This command sets the FM waveform type.

***RST** SINE

Key Entry **Sine** **Triangle** **Square** **Ramp** **Noise** **Dual-Sine** **Swept-Sine**

Remarks The waveform selection is only valid when INT[1] is the source selection. Refer to ":FM[1]|2:SOURce" on page 184 for type source selection.

:FM[1]|2:INTernal[1]:SWEep:TIME

Supported All Models

```
[:SOURce]:FM[1]|2:INTernal[1]:SWEep:TIME <val><unit>
[:SOURce]:FM[1]|2:INTernal[1]:SWEep:TIME?
```

This command sets the sweep time for the swept-sine waveform.

***RST**	+1.00000000E–001
Range	1.0mS–65.535S
Key Entry	**FM Sweep Time**
Remarks	Refer to ":FM[1]|2:INTernal[1]:FUNCtion:SHAPe" on page 182 for the waveform selection.

:FM[1]|2:INTernal[1]:SWEep:TRIGger

Supported All Models

```
[:SOURce]:FM[1]|2:INTernal[1]:SWEep:TRIGger BUS|IMMediate|EXTernal|KEY
[:SOURce]:FM[1]|2:INTernal[1]:SWEep:TRIGger?
```

This command sets the trigger source for the frequency modulated swept-sine waveform.

BUS	This choice enables GPIB triggering using the `*TRG` or `GET` command or LAN and RS-232 triggering using the `*TRG` command.
IMMediate	This choice enables immediate triggering of the sweep event.
EXTernal	This choice enables the triggering of a sweep event by an externally applied signal at the TRIG IN connector.
KEY	This choice enables triggering through front panel interaction by pressing the **Trigger** hardkey.
***RST**	IMM
Key Entry	**Bus** **Free Run** **Ext** **Trigger Key**
Remarks	Refer to ":FM[1]|2:INTernal[1]:FUNCtion:SHAPe" on page 182 for the waveform selection.

:FM[1]|2:SOURce

Supported All Models

```
[:SOURce]:FM[1]|2:SOURce INT[1]|EXT1|EXT2
[:SOURce]:FM[1]|2:SOURce?
```

This command sets the source to generate the frequency modulation.

INT This choice selects the internal source to provide an ac-coupled signal.

EXT This choice selects the EXT 1 INPUT or the EXT 2 INPUT connector to provide an externally applied signal that can be ac- or dc-coupled.

***RST** INT

Key Entry **Internal** **Ext1** **Ext2**

Remarks The externally applied, ac-coupled input signal is tested for a voltage level and a display annunciator will report a high or low condition if that voltage is > ±3% of 1 V_p.

:FM[1]|2:STATe

Supported All Models

```
[:SOURce]:FM[1]|2:STATe ON|OFF|1|0
[:SOURce]:FM[1]|2:STATe?
```

This command enables or disables the frequency modulation for the selected path.

***RST** 0

Key Entry **FM Off On**

Remarks The RF carrier is modulated when you set the signal generator's modulation state to ON, see ":MODulation[:STATe]" on page 129 for more information.

Whenever frequency modulation is enabled, the `FM` annunciator is turned on in the display.

The two paths for frequency modulation can be simultaneously enabled. Refer to ":FM[1]|2..." on page 179 for more information.

:FM[1]|2[:DEViation]

Supported All Models

```
[:SOURce]:FM[1]|2[:DEViation] <val><unit>
[:SOURce]:FM[1]|2[:DEViation]?
```

This command sets the frequency modulation deviation.

***RST** +1.00000000E+003

Range

Frequency	*Deviation*	Deviation Option UNJ
250kHZ–249.999MHZ	0–8MHZ	0–1MHZ
> 249.999–500MHZ	0–4MHZ	0–500kHZ
> 500MHZ–1GHZ	0–8MHZ	0–1MHZ
> 1–2GHZ	0–16MHZ	0–2MHZ
> 2–4GHZ	0–32MHZ	0–4MHZ
> 4–6GHZ	0–8MHZ	0–8MHZ

Key Entry **FM DEV**

Remarks If deviation tracking is ON, a change to the deviation value on one path will apply to both. Refer to ":FM[1]|2[:DEViation]:TRACk" on page 185 for more information and setting the deviation tracking.

:FM[1]|2[:DEViation]:TRACk

Supported All Models

```
[:SOURce]:FM[1]|2[:DEViation]:TRACk ON|OFF|1|0
[:SOURce]:FM[1]|2[:DEViation]:TRACk?
```

This command enables or disables the deviation coupling between the paths (FM[1] and FM2).

ON (1) This choice will link the deviation value of FM[1] with FM2; FM2 will assume the FM[1] deviation value. For example, if FM[1] deviation is set to 500 Hz and FM2 is set to 2 kHz, enabling the deviation tracking will cause the FM2 deviation value to change to 500 Hz. This applies regardless of the path (FM[1] or FM2) selected in this command

OFF (0) This choice disables the coupling and both paths will have independent deviation values.

***RST** 0

Key Entry **FM Dev Couple Off On**

Remarks This command uses exact match tracking, not offset tracking.

Low Frequency Output Subsystem ([:SOURce]:LFOutput)

:AMPLitude

Supported All Models

```
[:SOURce]:LFOutput:AMPLitude <val><unit>
[:SOURce]:LFOutput:AMPLitude?
```

This command sets the amplitude for the signal at the LF OUTPUT connector.

***RST** 0.00

Range 0.000VP–5.0VP

Key Entry **LF Out Amplitude**

:FUNCtion[1]:FREQuency

Supported All Models

```
[:SOURce]:LFOutput:FUNCtion[1]:FREQuency <val><unit>
[:SOURce]:LFOutput:FUNCtion[1]:FREQuency?
```

This command sets the internal modulation frequency for the following applications:

- the first tone of a dual-sine waveform
- the start frequency for a swept-sine waveform
- the frequency rate for all other waveforms

***RST** +4.00000000E+002

Range Sine: 0.1HZ–100KHZ Dual-Sine: 0.1HZ–100KHZ
Swept-Sine: 0.1HZ–100KHZ
All Other Waveforms: 0.1HZ–20KHZ

Key Entry **LF Out Tone 1 Freq** **LF Out Start Freq** **LF Out Freq**

Remarks Refer to ":FUNCtion[1]:SHAPe" on page 189 for selecting the waveform type.

:FUNCtion[1]:FREQuency:ALTernate

Supported All Models

```
[:SOURce]:LFOutput:FUNCtion[1]:FREQuency:ALTernate <val><unit>
[:SOURce]:LFOutput:FUNCtion[1]:FREQuency:ALTernate?
```

This command sets the frequency for the alternate LF output signal.

***RST** +4.00000000E+002

Range Dual-Sine: 0.1HZ–100KHZ Swept-Sine: 0.1HZ–100KHZ

Key Entry **LF Out Tone 2 Freq** **LF Out Stop Freq**

Remarks The alternate frequency is the second tone of a dual-sine or the stop frequency of a swept-sine waveform.

Refer to ":FUNCtion[1]:SHAPe" on page 189 for selecting the waveform type.

:FUNCtion[1]:FREQuency:ALTernate:AMPLitude:PERCent

Supported All Models

```
[:SOURce]:LFOutput:FUNCtion[1]:FREQuency:ALTernate:AMPLitude:
PERCent <val><unit>
[:SOURce]:LFOutput:FUNCtion[1]:FREQuency:ALTernate:AMPLitude:PERCent?
```

This command sets the amplitude of the second tone for a dual-sine waveform as a percentage of the total LF output amplitude. For example, if the second tone makes up 30% of the total amplitude, then the first tone is 70% of the total amplitude.

***RST** +5.00000000E+001

Range 0–100PCT

Key Entry **LF Out Tone 2 Ampl % of Peak**

Remarks Refer to ":FUNCtion[1]:SHAPe" on page 189 for selecting the waveform type.

:FUNCtion[1]:PERiod

Supported All Models

```
[:SOURce]:LFOutput:FUNCtion[1]:PERiod <val><unit>
[:SOURce]:LFOutput:FUNCtion[1]:PERiod?
```

This command sets the pulse period of the internally generated pulsed low frequency waveform.

***RST** +1.60000000E–005

Range 16uS–30S

Key Entry **LF Out Period**

:FUNCtion[1]:PWIDth

Supported All Models

```
[:SOURce]:LFOutput:FUNCtion[1]:PWIDth <val><unit>
[:SOURce]:LFOutput:FUNCtion[1]:PWIDth?
```

This command sets the pulse width of the internally-generated pulsed low frequency waveform.

The upper limit range value is restricted by the current value of the pulse period. For example, if the pulse period value is set to 16 µS, the pulse width is limited to a maximum range value of 16 µS.

***RST** +8.00000000E–006

Range 8uS–30S

Key Entry **LF Out Width**

Remarks To change the pulse period value, refer to ":FUNCtion[1]:PERiod" on page 188.

:FUNCtion[1]:SHAPe

Supported All Models

```
[:SOURce]:LFOutput:FUNCtion[1]:SHAPe SINE|DUALsine|SWEPtsine|TRIangle|
SQUare|RAMP|PULSe|NOISe|DC
[:SOURce]:LFOutput:FUNCtion[1]:SHAPe?
```

This command sets the waveform type for the generated signal at the LF output.

***RST** SINE

Key Entry **Sine** **Dual-Sine** **Swept-Sine** **Triangle** **Square** **Ramp** **Pulse** **Noise** **DC**

Remarks Function Generator must be the source selection to support DUALsine or the SWEPtsine waveform. Refer to ":SOURce" on page 190.

:FUNCtion[1]:SWEep:TIME

Supported All Models

```
[:SOURce]:LFOutput:FUNCtion[1]:SWEep:TIME <val><unit>
[:SOURce]:LFOutput:FUNCtion[1]:SWEep:TIME?
```

This command sets the sweep time for an internally generated swept-sine signal at the LF output.

***RST** +1.00000000E–001

Range 1mS–65.535S

Key Entry **LF Out Sweep Time**

:FUNCtion[1]:SWEep:TRIGger

Supported All Models

```
[:SOURce]:LFOutput:FUNCtion[1]:SWEep:TRIGger BUS|IMMediate|EXTernal|KEY
[:SOURce]:LFOutput:FUNCtion[1]:SWEep:TRIGger?
```

This command sets the trigger source for the internally generated swept-sine waveform signal at the LF output.

BUS This choice enables GPIB triggering using the `*TRG` or `GET` command or LAN and RS-232 triggering using the `*TRG` command.

IMMediate This choice enables immediate triggering of the sweep event.

EXTernal This choice enables the triggering of a sweep event by an externally applied signal at the TRIG IN connector.

KEY — This choice enables triggering through front panel interaction by pressing the **Trigger** hardkey.

***RST** — IMM

Key Entry — **Bus** **Free Run** **Ext** **Trigger Key**

Remarks — Refer to ":FUNCtion[1]:SHAPe" on page 189 for selecting the waveform type.

:SOURce

Supported — All Models

```
[:SOURce]:LFOutput:SOURce INT[1]|FUNCtion
[:SOURce]:LFOutput:SOURce?
```

This command sets the low frequency source for the LF output.

INT[1] — This choice enables you to output a signal where the frequency and shape of the signal is set by the internal source as it is being used by a modulation. For example, if the internal source is currently assigned to an AM path configuration and AM is turned on, the signal output at the LF OUTPUT connector will have the frequency and shape of the amplitude modulating signal.

FUNCtion — This choice enables the selection of an internal function generator.

***RST** — FUNC

Key Entry — **Internal Monitor** **Function Generator**

:STATe

Supported — All Models

```
[:SOURce]:LFOutput:STATe ON|OFF|1|0
[:SOURce]:LFOutput:STATe?
```

This command enables or disables the low frequency output.

***RST** — 0

Key Entry — **LF Out Off On**

Phase Modulation Subsystem ([:SOURce])

:PM[1]|2...

Supported All Models

`[:SOURce]:PM[1]|2...`

This prefix enables the selection of the ΦM path and is part of most SCPI commands associated with this subsystem. The two paths are equivalent to the **ΦM Path 1 2** softkey.

PM[1]	**ΦM Path 1 2** with 1 selected
PM2	**ΦM Path 1 2** with 2 selected

When just PM is shown in a command, this means the command applies globally to both paths.

Each path is set up separately. When a SCPI command uses PM[1], only path one is affected. Consequently, when PM2 is selected, only path two is set up. However, the deviation of the signals for the two paths can be coupled.

Deviation coupling links the deviation value of PM[1] to PM2. Changing the deviation value for one path will change it for the other path.

These two paths can be on at the same time provided the following conditions have been met:

- DUALsine or SWEPtsine is not the selection for the waveform type
- each path uses a different source (Internal 1, Ext1, or Ext2)
- PM2 must be set to a deviation less than or equal to PM[1]

:PM:INTernal:FREQuency:STEP[:INCRement]

Supported All Models

```
[:SOURce]:PM:INTernal:FREQuency:STEP[:INCRement] <num>
[:SOURce]:PM:INTernal:FREQuency:STEP[:INCRement]?
```

This command sets the step increment of the phase modulation internal frequency.

The variable <num> sets the entered value in units of Hertz.

Range 0.5–1E6

Key Entry **Incr Set**

Remarks The value set by this command is used with the UP and DOWN choices for the FM frequency command. Refer to ":PM[1]|2:INTernal[1]:FREQuency" on page 193for more information.

The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:PM[1]|2:BANDwidth|BWIDth

Supported All Models

```
[:SOURce]:PM[1]|2:BANDwidth|BWIDth NORMal|HIGH
[:SOURce]:PM[1]|2:BANDwidth|BWIDth?
```

This command toggles between normal phase modulation and high bandwidth phase modulation mode.

***RST** NORM

Key Entry **FM ΦM Normal High BW**

:PM[1]|2:EXTernal[1]:COUPling

Supported All Models

```
[:SOURce]:PM[1]|2:EXTernal[1]:COUPling AC|DC
[:SOURce]:PM[1]|2:EXTernal[1]:COUPling?
```

This command sets the coupling for the phase modulation source through the selected external input connector.

AC	This choice will only pass ac signal components.
DC	This choice will pass both ac and dc signal components.
***RST**	DC
Key Entry	**Ext Coupling DC AC**
Remarks	This command does not change the currently active source or switch the current modulation on or off. The modulating signal may be the sum of several signals, either internal or external sources.

:PM[1]|2:INTernal[1]:FREQuency

Supported All Models

```
[:SOURce]:PM[1]|2:INTernal[1]:FREQuency <val><unit>|UP|DOWN
[:SOURce]:PM[1]|2:INTernal[1]:FREQuency?
```

This command sets the internal modulation frequency rate for the following applications:

- the first tone of a dual-sine waveform
- the start frequency for a swept-sine waveform
- the frequency rate for all other waveforms

***RST**	+4.00000000E+002
Range	Dual-Sine: 0.1HZ–100KHZ Swept-Sine: 0.1HZ–100KHZ All Other Waveforms: 0.1HZ–20KHZ
Key Entry	**ΦMTone 1 Rate** **ΦM Start Rate** **ΦM Rate**
Remarks	Refer to “:FUNCtion[1]:SHAPe” on page 189 for selecting the waveform type.

:PM[1]|2:INTernal[1]:FREQuency:ALTernate

Supported All Models

```
[:SOURce]:PM[1]|2:INTernal[1]:FREQuency:ALTernate <val><unit>
[:SOURce]:PM[1]|2:INTernal[1]:FREQuency:ALTernate?
```

This command sets the frequency for the alternate signal.

***RST** +4.00000000E+002

Range Dual-Sine: 0.1HZ–100KHZ Swept-Sine: 0.1HZ–100KHZ

Key Entry **ΦM Stop Rate** **ΦM Tone 2 Rate**

Remarks The alternate frequency is the second tone of a dual-sine or the stop frequency of a swept-sine waveform.

Refer to ":PM[1]|2:INTernal[1]:FUNCtion:SHAPe" on page 195 for the waveform selection.

:PM[1]|2:INTernal[1]:FREQuency:ALTernate:AMPLitude:PERCent

Supported All Models

```
[:SOURce]:PM[1]|2:INTernal[1]:FREQuency:ALTernate:AMPLitude:
PERCent <val><unit>
[:SOURce]:PM[1]|2:INTernal[1]:FREQuency:ALTernate:AMPLitude:PERCent?
```

This command sets the amplitude of the second tone for the dual-sine waveform as a percentage of the total amplitude. For example, if the second tone makes up 30% of the total amplitude, then the first tone is 70% of the total amplitude.

***RST** +5.00000000E+001

Range 0–100PCT

Key Entry **ΦM Tone 2 Ampl Percent of Peak**

Remarks Refer to ":PM[1]|2:INTernal[1]:FUNCtion:SHAPe" on page 195 for the waveform selection.

:PM[1]|2:INTernal[1]:FUNCtion:SHAPe

Supported All Models

```
[:SOURce]:PM[1]|2:INTernal[1]:FUNCtion:SHAPe SINE|TRIangle|SQUare|RAMP|
NOISe|DUALsine|SWEPtsine
[:SOURce]:PM[1]|2:INTernal[1]:FUNCtion:SHAPe?
```

This command sets the phase modulation waveform type.

***RST** SINE

Key Entry **Sine** **Triangle** **Square** **Ramp** **Noise** **Dual-Sine** **Swept-Sine**

Remarks The waveform selection is only valid when INT[1] is the source selection. Refer to ":PM[1]|2:SOURce" on page 196 for type source selection.

:PM[1]|2:INTernal[1]:SWEep:TIME

Supported All Models

```
[:SOURce]:PM[1]|2:INTernal[1]:SWEep:TIME <val><unit>
[:SOURce]:PM[1]|2:INTernal[1]:SWEep:TIME?
```

This command sets the sweep time for a phase-modulated, swept-sine waveform.

***RST** +1.00000000E–001

Range 1.0mS–65.535S

Key Entry **ΦM Sweep Time**

Remarks Refer to ":PM[1]|2:INTernal[1]:FUNCtion:SHAPe" for the waveform selection.

:PM[1]|2:INTernal[1]:SWEep:TRIGger

Supported All Models

```
[:SOURce]:PM[1]|2:INTernal[1]:SWEep:TRIGger BUS|IMMediate|EXTernal|KEY
[:SOURce]:PM[1]|2:INTernal[1]:SWEep:TRIGger?
```

This command sets the trigger source for the phase-modulated, swept-sine waveform.

BUS This choice enables GPIB triggering using the `*TRG` or `GET` command or LAN and RS-232 triggering using the `*TRG` command.

IMMediate This choice enables immediate triggering of the sweep event.

EXTernal This choice enables the triggering of a sweep event by an externally applied signal at the TRIG IN connector.

KEY	This choice enables triggering through front panel interaction by pressing the **Trigger** hardkey.
***RST**	IMM
Key Entry	**Bus** **Free Run** **Ext** **Trigger Key**
Remarks	Refer to ":PM[1]|2:INTernal[1]:FUNCtion:SHAPe" on page 195 for the waveform selection.

:PM[1]|2:SOURce

Supported All Models

```
[:SOURce]:PM[1]|2:SOURce INT[1]|EXT1|EXT2
[:SOURce]:PM[1]|2:SOURce?
```

This command sets the source to generate the phase modulation.

INT	This choice selects internal source 1 to provide an ac-coupled signal.
EXT	This choice selects the EXT 1 INPUT or the EXT 2 INPUT connector to provide an externally applied signal that can be ac- or dc-coupled.
***RST**	INT
Key Entry	**Internal 1** **Ext1** **Ext2**
Remarks	The externally applied, ac-coupled input signal is tested for a voltage level and a display annunciator will report a high or low condition if that voltage is > ±3% of 1 V_p.

:PM[1]|2:STATe

Supported All Models

```
[:SOURce]:PM[1]|2:STATe ON|OFF|1|0
[:SOURce]:PM[1]|2:STATe?
```

This command enables or disables the phase modulation for the selected path.

***RST**	0
Key Entry	**ΦM Off On**
Remarks	The RF carrier is modulated when you set the signal generator's modulation state to ON, see ":MODulation[:STATe]" on page 129 for more information. Whenever phase modulation is enabled, the ΦM annunciator is turned on in the display

The two paths for phase modulation can be simultaneously enabled. Refer to “:PM[1]|2...” on page 191 for more information.

:PM[1]|2[:DEViation]

Supported All Models

```
[:SOURce]:PM[1]|2[:DEViation] <val><unit>|UP|DOWN
[:SOURce]:PM[1]|2[:DEViation]?
```

This command sets the deviation of the phase modulation.

The variable <unit> will accept RAD (radians), PIRAD (pi-radians), and DEG (degrees); however, the query will only return values in radians.

***RST** +0.00000000E+000

Range

Frequency	*Normal Bandwidth*	*High Bandwidth*
250kHZ–249.999MHZ	0–10RAD	0–1RAD
> 249.999–500MHZ	0–5RAD	0–0.5RAD
> 500MHZ–1GHZ	0–10RAD	0–1RAD
> 1–2GHZ	0–20RAD	0–2RAD
> 2–4GHZ	0–40RAD	0–4RAD
> 4–6GHZ	0–80RAD	0–8RAD

Key Entry **ΦM Dev**

Remarks If deviation tracking is active, a change to the deviation value on one path will apply to both.

Refer to “:PM[:DEViation]:STEP[:INCRement]” on page 198 for setting the value associated with the UP and DOWN choices.

:PM[1]|2[:DEViation]:TRACk

Supported All Models

```
[:SOURce]:PM[1]|2[:DEViation]:TRACk ON|OFF|1|0
[:SOURce]:PM[1]|2[:DEViation]:TRACk?
```

This command enables or disables the deviation coupling between the paths (PM[1] and PM2).

ON (1) This choice will link the deviation value of PM[1] with PM2; PM2 will assume the PM[1] deviation value. For example, if PM[1] deviation is set to 500 Hz and

PM2 is set to 2 kHZ, enabling the deviation tracking will cause the PM2 deviation value to change to 500 Hz. This applies regardless of the path (PM[1] or PM2) selected in this command.

OFF (0) This choice disables the coupling and both paths will have independent deviation values.

***RST** 0

Key Entry **ΦM Dev Couple Off On**

Remarks This command uses exact match tracking, not offset tracking.

:PM[:DEViation]:STEP[:INCRement]

Supported All Models

```
[:SOURce]:PM[:DEViation]:STEP[:INCRement] <val><unit>
[:SOURce]:PM[:DEViation]:STEP[:INCRement]?
```

This command sets the phase modulation deviation step increment.

Range 0.001–1E3RAD

Key Entry **Incr Set**

Remarks The value set by this command is used with the UP and DOWN choices for the FM deviation command. Refer to ":PM[1]|2[:DEViation]" on page 197 for more information.

The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

Pulse Modulation Subsystem ([:SOURce]:PULM)

:INTernal[1]:FREQuency

Supported All Models

```
[:SOURce]:PULM:INTernal[1]:FREQuency <val><unit>|UP|DOWN
[:SOURce]:PULM:INTernal[1]:FREQuency?
```

This command sets the rate of the internal square wave pulse modulation source.

***RST** +4.00000000E+002

Range 0.1HZ–20.0kHZ

Key Entry **Pulse Rate**

Remarks This command is used when SQUare is the current pulse modulation type. Refer to ":SOURce" on page 202 for the pulse modulation type selection.

:INTernal[1]:FREQuency:STEP

Supported All Models

```
[:SOURce]:PULM:INTernal[1]:FREQuency:STEP[:INCRement] <frequency>MIN|MAX
[:SOURce]:PULM:INTernal[1]:FREQuency:STEP[INCRement]?
```

This command sets the step value for the internally-generated square wave pulse rate.

This command is used when SQUare is the pulse modulation type. Refer to ":SOURce" on page 202 for the pulse modulation type selection. The step value, set with this command, is used with the `UP` and `DOWN` choices in the :INTernal[1]:FREQuency command.

The step value set with this command is not affected by a power-on, preset, or `*RST` command.

Example

```
:PULM:INT:FREQ:STEP MIN
```

The preceding example sets the step value for the square wave pulse rate to 0.1 Hz, the minimum rate.

Range 0.1HZ–20kHZ

:INTernal[1]:FUNCtion:SHAPe

Supported All Models

```
[:SOURce]:PULM:INTernal[1]:FUNCtion:SHAPe PULSe|SQUare
[:SOURce]:PULM:INTernal[1]:FUNCtion:SHAPe?
```

This command sets the internal pulse modulation waveform type.

***RST** PULS

Key Entry **Internal Square** **Internal Pulse**

:INTernal[1]:PERiod

Supported All Models

```
[:SOURce]:PULM:INTernal[1]:PERiod <val><unit>|UP|DOWN
[:SOURce]:PULM:INTernal[1]:PERiod?
```

This command sets the period for the internally generated pulse modulation source.

***RST** +8.00000000E-005

Range 8uS–30S

Key Entry **Pulse Period**

Remarks If the entered value for the pulse period is equal to or less than the value for the pulse width, the pulse width changes to a value that is equal to the pulse period.

Refer to ":INTernal[1]:PERiod:STEP[:INCRement]" on page 200 for setting the value associated with the UP and DOWN choices.

:INTernal[1]:PERiod:STEP[:INCRement]

Supported All Models

```
[:SOURce]:PULM:INTernal[1]:PERiod:STEP[:INCRement] <val><unit>|UP|DOWN
[:SOURce]:PULM:INTernal[1]:PERiod:STEP[:INCRement]?
```

This command sets the period time step increment for the internally-generated pulse modulation source.

***RST** +1.00000000E–006

Range 4uS–30S

Key Entry **Incr Set**

Remarks The value set by this command is used with the UP and DOWN choices for the pulse period command. Refer to ":INTernal[1]:PERiod" on page 200 for more information.

:INTernal[1]:PWIDth

Supported All Models

```
[:SOURce]:PULM:INTernal[1]:PWIDth <val><unit> |UP|DOWN
[:SOURce]:PULM:INTernal[1]:PWIDth?
```

This command sets the pulse width for the internally generated pulse modulation source.

NOTE A power search is recommended for signals with pulse widths less than one microsecond. Refer to ":ALC:SEARch" on page 60.

***RST** +4.00000000E-005

Range 4uS–30S

Key Entry **Pulse Width**

Remarks If the entered value for the pulse width is equal to or greater than the value for the pulse period, the pulse width will change to a value that is equal to the pulse period.

Refer to ":INTernal[1]:PWIDth:STEP" on page 201 for setting the value associated with the UP and DOWN choices.

:INTernal[1]:PWIDth:STEP

Supported All Models

```
[:SOURce]:PULM:INTernal[1]:PWIDth:STEP <num>[<time suffix>]
[:SOURce]:PULM:INTernal[1]:PWIDth:STEP?
```

This command sets the step increment for the pulse width.

The optional variable `[<time suffix>]` accepts nS (nano-seconds) to S (seconds).

***RST** +1.00000000E–006

Range 4uS–30S

Remarks The value set by this command is used by the UP and DOWN choices for the pulse width command. Refer to ":INTernal[1]:PWIDth" on page 201 for more information.

:SOURce

Supported All Models

```
[:SOURce]:PULM:SOURce INT|EXT[1]|EXT2
[:SOURce]:PULM:SOURce?
```

This command sets the source that will generate the pulse modulation.

***RST** INT

Key Entry **Internal Square** **Internal Pulse** **Ext1 DC-Coupled** **Ext2 DC-Coupled**

:STATe

Supported All Models

```
[:SOURce]:PULM:STATe ON|OFF|1|0
[:SOURce]:PULM:STATe?
```

This command enables or disables the operating state of the pulse modulation source.

***RST** 0

Key Entry **Pulse Off On**

Remarks When pulse modulation is enabled, the `PULSE` annunciator is shown in the display

5 Component Test Digital Commands

This chapter provides SCPI descriptions for commands dedicated to digital component testing using the E4438C ESG Vector Signal Generator. This chapter contains the following major sections:

All Subsystem–Option 001/601 or 002/602 ([:SOURce])

:RADio:ALL:OFF

Supported E4438C with Option 001/601or 002/602

`[:SOURce]:RADio:ALL:OFF`

This command disables the digital modulation formats.

Remarks This command does not affect analog modulation.

AWGN ARB Subsystem–Option 403 ([:SOURce]:RADio:AWGN:ARB)

:BWIDth

Supported E4438C with Option 403

```
[:SOURce]:RADio:AWGN:ARB:BWIDth <val>
[:SOURce]:RADio:AWGN:ARB:BWIDth?
```

This command adjusts the bandwidth of the AWGN waveform.

The variable <val> is expressed in units of Hertz (Hz–MHz).

***RST**	+1.00000000E+006
Range	5E4–1.5E7
Key Entry	**Bandwidth**

:IQ:EXTernal:FILTer

Supported E4438C with Option 403

```
[:SOURce]:RADio:AWGN:ARB:IQ:EXTernal:FILTer 40e6|THRough
[:SOURce]:RADio:AWGN:ARB:IQ:EXTernal:FILTer?
```

This command selects the filter or through path for I/Q signals routed to the rear panel I and Q outputs. Selecting a filter setting with this command will automatically set the ":IQ:EXTernal:FILTer:AUTO" on page 206 command to Off mode.

40e6	This choice applies a 40 MHz baseband filter.
THRough	This choice bypasses filtering.
***RST**	THR
Key Entry	**40.000 MHz** **Through**

:IQ:EXTernal:FILTer:AUTO

Supported E4438C with Option 403

```
[:SOURce]:RADio:AWGN:ARB:IQ:EXTernal:FILTer:AUTO ON|OFF|1|0
[:SOURce]:RADio:AWGN:ARB:IQ:EXTernal:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals routed to the rear panel I/Q outputs.

ON(1) This choice will automatically select a digital modulation filter optimized for the current signal generator settings.

OFF(0) This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to ":IQ:EXTernal:FILTer" on page 205 for selecting a filter or through path.

***RST** ON

Key Entry **I/Q Output Filter Manual Auto**

:HEADer:CLEar

Supported E4438C with Option 403

```
[:SOURce]:RADio:AWGN:ARB:HEADer:CLEar
```

This command clears the header information from the file header used by this modulation format.

Key Entry **Clear Header**

Remarks The **AWGN Off On** softkey must be set to On for this command to function.

:HEADer:SAVE

Supported E4438C with Option 403

```
[:SOURce]:RADio:AWGN:ARB:HEADer:SAVE
```

This command saves the header information to the file header used by this modulation format.

Key Entry **Save Setup To Header**

Remarks The **AWGN Off On** softkey must be set to On for this command to function.

:IQ:MODulation:ATTen

Supported E4438C with Option 403

```
[:SOURce]:RADio:AWGN:ARB:IQ:MODulation:ATTen <val>
[:SOURce]:RADio:AWGN:ARB:IQ:MODulation:ATTen?
```

This command attenuates the I/Q signals being modulated through the signal generator RF path.

The variable <val> is expressed in units of decibels (dB).

***RST** +2.00000000E+000

Range 0–40

Key Entry **Modulator Atten Manual Auto**

:IQ:MODulation:ATTen:AUTO

Supported E4438C with Option 403

```
[:SOURce]:RADio:AWGN:ARB:IQ:MODulation:ATTen:AUTO ON|OFF|1|0
[:SOURce]:RADio:AWGN:ARB:IQ:MODulation:ATTen:AUTO?
```

This command enables or disables the I/Q attenuation auto mode.

ON (1) This choice enables the attenuation auto mode which optimizes the modulator attenuation for the current conditions.

OFF (0) This choice holds the attenuator at its current setting or at a selected value. Refer to “:IQ:MODulation:ATTen” for setting the attenuation value.

***RST** 1

Key Entry **Modulator Atten Manual Auto**

:IQ:MODulation:FILTer

Supported E4438C with Option 403

```
[:SOURce]:RADio:AWGN:ARB:IQ:MODulation:FILTer 2.1e6|40e6|THRough
[:SOURce]:RADio:AWGN:ARB:IQ:MODulation:FILTer?
```

This command enables you to select a filter or through path for I/Q signals modulated onto the RF carrier. Selecting a filter with this command will automatically set ":IQ:MODulation:ATTen:AUTO" on page 207 to Off(0) mode.

2.1E6	This choice applies a 2.1 MHz baseband filter to the I/Q signals.
40E6	This choice applies a 40 MHz baseband filter to the I/Q signals.
THRough	This choice bypasses filtering.
***RST**	THR
Key Entry	**2.100 MHz** **40.000 MHz** **Through**

:IQ:MODulation:FILTer:AUTO

Supported E4438C with Option 403

```
[:SOURce]:RADio:AWGN:ARB:IQ:MODulation:FILTer:AUTO ON|OFF|1|0
[:SOURce]:RADio:AWGN:ARB:IQ:MODulation:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals modulated onto the RF carrier.

ON(1)	This choice will automatically select a digital modulation filter.
OFF(0)	This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to ":IQ:MODulation:FILTer" on page 303 for selecting a filter or through path.
***RST**	1
Key Entry	**I/Q Mod Filter Manual Auto**

:MDEStination:AAMPlitude

Supported E4438C with Option 403

```
[:SOURce]:RADio:AWGN:ARB:MDEStination:AAMPlitude NONE|M1|M2|M3|M4
[:SOURce]:RADio:AWGN:ARB:MDEStination:AAMPlitude?
```

This command routes the selected marker to the Alternate Amplitude function. The `NONE` parameter clears the marker for the Alternate Amplitude function.

***RST** NONE

Key Entry **None** **Marker 1** **Marker 2** **Marker 3** **Marker 4**

:MDEStination:ALCHold

Supported E4438C with Option 403

CAUTION Incorrect automatic level control (ALC) sampling can create a sudden unleveled condition that may create a spike in the RF output potentially damaging a DUT or connected instrument. Ensure that you set markers to let the ALC sample over an amplitude that accounts for the high power levels within the signal.

```
[:SOURce]:RADio:AWGN:ARB:MDEStination:ALCHold NONE|M1|M2|M3|M4
[:SOURce]:RADio:AWGN:ARB:MDEStination:ALCHold?
```

This command enables or disables the marker ALC hold function for the selected marker. For setting markers, see “:MARKer:[SET]” on page 306.

Use the ALC hold function when you have a waveform signal that has idle periods, or when the increased dynamic range encountered with RF blanking is not desired. The ALC leveling circuitry responds to the marker signal during the marker pulse (marker signal high), averaging the modulated signal level during this period.

The ALC hold function operates during the low periods of the marker signal. The marker polarity determines when the marker signal is high. For a positive polarity, this is during the marker points. For a negative polarity, this is when there are no marker points. For setting a marker’s polarity, see “:MPOLarity:MARKer1|2|3|4” on page 375.

NOTE Do not use the ALC hold for more than 100 ms, because it can affect the waveform’s output amplitude.

The marker signal has a minimum of a two-sample delay in its response relative to the waveform signal response. To compensate for the marker signal delay, offset marker points from the waveform sample point at which you want the ALC sampling to begin.

The ALC hold setting is part of the file header information, so saving the setting to the file header saves the current marker routing for the waveform file.

NOTE	A waveform file that has unspecified settings in the file header uses the previous waveform's routing settings.

For more information on the marker ALC hold function, see the *E4428C/38C ESG Signal Generators User's Guide*. For setting the marker points, see ":MARKer:[SET]" on page 306.

NONE This terminates the marker ALC hold function.

M1–M4 These are the marker choices. The ALC hold feature uses only one marker at a time.

***RST** NONE

Example

```
:RAD:AWGB:ARB:MDES:ALCH M1
```

The preceding example routes marker 1 to the ALC Hold function.

Key Entry	**None**	**Marker 1**	**Marker 2**	**Marker 3**	**Marker 4**

Remarks N/A

:MDEStination:PULSe

Supported E4438C with Option 403

CAUTION	The pulse function incorporates ALC hold. Incorrect automatic level control (ALC) sampling can create a sudden unleveled condition that may create a spike in the RF output potentially damaging a DUT or connected instrument. Ensure that you set markers to let the ALC sample over an amplitude that accounts for the high power levels within the signal.

```
[:SOURce]:RADio:ARB:MDEStination:PULSe NONE|M1|M2|M3|M4
[:SOURce]:RADio:ARB:MDEStination:PULSe?
```

This command enables or disables the marker pulse/RF blanking function for the selected marker.

This function automatically uses the ALC hold function, so there is no need to select both the ALC hold and the pulse/RF blanking for the same marker.

NOTE Do not use ALC hold for more than 100 ms, because it can affect the waveform's output amplitude.

The signal generator blanks the RF output when the marker signal goes low. The marker polarity determines when the marker signal is low. For a positive polarity, this is during the marker points. For a negative polarity, this is when there are no marker points. For setting a marker's polarity, see ":MPOLarity:MARKer1|2|3|4" on page 337.

NOTE Set marker points prior to using this function. Enabling this function without setting marker points may create a continuous low or high marker signal, depending on the marker polarity. This causes either no RF output or a continuous RF output. See ":MARKer:[SET]" on page 306 for setting the marker points.

The marker signal has a minimum of a two-sample delay in its response relative to the waveform signal response. To compensate for the marker signal delay, offset marker points from the waveform sample point at which you want the RF blanking to begin. The RF blanking setting is part of the file header information, so saving the setting to the file header saves the current marker routing for the waveform file.

NOTE A waveform file that has unspecified settings in the file header uses the previous waveform's routing settings. This could create the situation where there is no RF output signal, because the previous waveform used RF blanking.

For more information on the marker RF blanking function, see the *E4428C/38C ESG Signal Generators User's Guide*.

NONE This terminates the marker RF blanking/pulse function.

M1–M4 These are the marker choices. The RF blanking/pulse feature uses only one marker at a time.

Example

```
:RAD:ARB:MDES:PULS M2
```

The preceding example routes marker 2 to Pulse/RF Blanking.

***RST** NONE

Key Entry **None** **Marker 1** **Marker 2** **Marker 3** **Marker 4**

:MPOLarity:MARKer1|2|3|4

Supported E4438C with Option 403

```
[:SOURce]:RADio:AWGN:ARB:MPOLarity:MARKer1|2|3|4 NEGative|POSitive
[:SOURce]:RADio:AWGN:ARB:MPOLarity:MARKer1|2|3|4?
```

This command sets the polarity for the selected marker. For a positive marker polarity, the marker signal is high during the marker points. For a negative marker polarity, the marker signal is high during the period of no marker points.

***RST** POS

Key Entry **Marker 1 Polarity Neg Pos** **Marker 2 Polarity Neg Pos** **Marker 3 Polarity Neg Pos**

Marker 4 Polarity Neg Pos

:LENgth

Supported E4438C with Option 403

```
[:SOURce]:RADio:AWGN:ARB:LENgth 1048576|524288|262144|131072|65536|
32768|16384
[:SOURce]:RADio:AWGN:ARB:LENgth?
```

This command specifies the length (number of points) of the AWGN waveform.

***RST** +524288

Key Entry **1048576** **524288** **262144** **131072** **65536** **32768** **16384**

Remarks A longer waveform yields a statistically more correct waveform.

:REFerence:EXTernal:FREQuency

Supported E4438C with Option 403

```
[:SOURce]:RADio:AWGN:ARB:REFerence:EXTernal:FREQuency <val>
[:SOURce]:RADio:AWGN:ARB:REFerence:EXTernal:FREQuency?
```

This command allows you to enter the frequency of the applied external reference.

The variable `<val>` is expressed in units of hertz (Hz–MHz).

***RST** +1.00000000E+007

Range 2.5E5–1E8

Key Entry **Reference Freq**

Remarks The value specified by this command is effective only when you are using an external ARB reference applied to the BASEBAND GEN REF IN rear panel connector.

To specify external as the ARB reference source type, refer to ":REFerence[:SOURce]" on page 281.

:REFerence[:SOURce]

Supported E4438C with Option 403

```
[:SOURce]:RADio:AWGN:ARB:REFerence[:SOURce] INTernal|EXTernal
[:SOURce]:RADio:AWGN:ARB:REFerence[:SOURce]?
```

This command selects either an internal or external reference for the waveform clock.

***RST** INT

Key Entry **ARB Reference Ext Int**

Remarks If the EXTernal choice is selected, the external frequency *value must* be entered and the signal must be applied to the BASEBAND GEN REF IN rear panel connector.

Refer to ":REFerence:EXTernal:FREQuency" on page 280 to enter the external reference frequency.

:SCLock:RATE

Supported E4438C with Option 403

```
[:SOURce]:RADio:AWGN:ARB:SCLock:RATE <val>
[:SOURce]:RADio:AWGN:ARB:SCLock:RATE?
```

This command sets the sample clock rate for the AWGN modulation format.

The variable <val> is expressed in units of hertz.

***RST** +1.00000000E+008

Range 1–1E8

Key Entry **ARB Sample Clock**

Remarks The modulation format should be active before executing this command. If this command is executed before the modulation format is active, the entered value will be overridden by a calculated factory default value. Refer to "[:STATe]" on page 214 to activate the modulation format.

:SEED

Supported E4438C with Option 403

```
[:SOURce]:RADio:AWGN:ARB:SEED FIXed|RANDom
[:SOURce]:RADio:AWGN:ARB:SEED?
```

This command toggles the AWGN waveform noise seed value type.

FIXed This choice selects a fixed noise seed value.

RANDom This choice selects a randomly generated noise seed value.

***RST** FIX

Key Entry **Noise Seed Fixed Random**

[:STATe]

Supported E4438C with Option 403

```
[:SOURce]:RADio:AWGN:ARB[:STATe] ON|OFF|1|0
[:SOURce]:RADio:AWGN:ARB[:STATe]?
```

This command enables or disables the AWGN generator function.

***RST** 0

Key Entry **Arb AWGN Off On**

CDMA ARB Subsystem–Option 401 ([:SOURce]:RADio:CDMA:ARB)

:CLIPping:I

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:CLIPping:I <val>
[:SOURce]:RADio:CDMA:ARB:CLIPping:I?
```

This command clips (limits) the modulation level of the waveform’s I component to a percentage of full scale.

The variable <val> is expressed in units of percent.

***RST** +1.00000000E+002

Range 10–100

Key Entry **Clip |I| To**

:CLIPping:POSition

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:CLIPping:POSition PRE|POST
[:SOURce]:RADio:CDMA:ARB:CLIPping:POSition?
```

This command specifies whether a waveform is clipped before (PRE) or after (POST) FIR filtering.

***RST** PRE

Key Entry **Clip At PRE POST FIR Filter**

:CLIPping:Q

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:CLIPping:Q <val>
[:SOURce]:RADio:CDMA:ARB:CLIPping:Q?
```

This command clips (limits) the modulation level of the waveform’s Q component to a percentage of full scale.

The variable <val> is expressed in units of percent.

***RST** +1.00000000E+002

Range 10–100

Key Entry **Clip |Q| To**

:CLIPping:TYPE

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:CLIPping:TYPE IJQ|IORQ
[:SOURce]:RADio:CDMA:ARB:CLIPping:TYPE?
```

This command selects either `IJQ` or `IORQ` as the clipping type.

IJQ The combined I and Q waveform will be clipped (*circular* clipping).

IORQ The I and Q components of the waveform are clipped independently (*rectangular* clipping). I and Q can be clipped to different levels using this mode.

***RST** IJQ

Key Entry **Clipping Type |I+jQ| |I|,|Q|**

:CLIPping[:IJQ]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:CLIPping[:IJQ] <val>
[:SOURce]:RADio:CDMA:ARB:CLIPping[:IJQ]?
```

This command clips (limits) the modulation level of the combined I and Q waveform to a percentage of full scale.

The variable <val> is expressed in units of percent.

***RST** +1.00000000E+002

Range 10–100

Key Entry **Clip |I+jQ| To**

:CRATe

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:CRATe <val>
[:SOURce]:RADio:CDMA:ARB:CRATe?
```

This command sets the chip rate value.

The variable <val> is expressed as chips per second (cps–Mcps).

***RST**	+1.22880000E+006
Range	10–8E6
Key Entry	**Chip Rate**

:IQ:EXTernal:FILTer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:IQ:EXTernal:FILTer 40e6|THRough
[:SOURce]:RADio:CDMA:ARB:IQ:EXTernal:FILTer?
```

This command selects the filter or through path for I/Q signals routed to the rear panel I and Q outputs. Selecting a filter using this command will automatically set “:IQ:EXTernal:FILTer:AUTO” on page 217 to OFF(0) mode.

40e6	This choice applies a 40 MHz baseband filter.
THRough	This choice bypasses filtering.
***RST**	THR
Key Entry	**40.000 MHz** **Through**

:IQ:EXTernal:FILTer:AUTO

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:IQ:EXTernal:FILTer:AUTO ON|OFF|1|0
[:SOURce]:RADio:CDMA:ARB:IQ:EXTernal:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals routed to the rear panel I/Q outputs.

ON(1)	This choice will automatically select a digital modulation filter optimized for the current signal generator settings.
OFF(0)	This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to “:IQ:EXTernal:FILTer” on page 217 for selecting a filter or through path.
***RST**	1
Key Entry	**I/Q Output Filter Manual Auto**

:FILTer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:FILTer RNYQuist|NYQuist|GAUSsian|RECTangle|
IS95|IS95_EQ|IS95_MOD|IS95_MOD_EQ|WCDMA|AC4Fm|IS2000SR3DS|UGGaussian|
"<user FIR>"
[:SOURce]:RADio:CDMA:ARB:FILTer?
```

This command selects the pre-modulation filter type.

IS95	This choice selects a filter that meets the criteria of the IS-95 standard.
IS95_EQ	This choice selects a filter which is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard. This filter is only used for IS-95 baseband filtering.
IS95_MOD	This choice selects a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.
IS95_MOD_EQ	This choice selects a filter which is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance), with lower passband rejection.
WCDMa	This choice selects a 0.22 Nyquist filter optimized for ACP.
AC4Fm	This choice selects a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.
IS2000SR3DS	This choice selects an IS-2000 standard, spread rate 3 direct spread filter.
UGGaussian	This choice selects a backwards compatible GSM Gaussian filter (Gaussian filter with a fixed BbT value of 0.300) for the ESG E44xxB Option UN3 or UN4.
"<user FIR>"	This variable is any FIR filter file that you have stored in memory. The variable needs no directory path indicating the location of the file, such as FIR: or /USER/FIR. The command assumes the FIR directory. Refer to “File Name Variables” on page 13 for more information on file names.

***RST** IS95_MOD_EQ

Key Entry **Root Nyquist** **Nyquist** **Gaussian** **Rectangle** **IS-95** **IS-95 w/EQ** **IS-95 Mod** **IS-95 Mod w/EQ** **WCDMA** **APCO 25 C4FM** **IS-2000 SR3 DS** **UN3/4 GSM Gaussian** **User FIR**

:FILTer:ALPHa

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:FILTer:ALPHa <val>
[:SOURce]:RADio:CDMA:ARB:FILTer:ALPHa?
```

This command changes the Nyquist or root Nyquist filter’s alpha value.

The filter alpha value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +5.00000000E–001

Range 0.000–1.000

Key Entry Filter Alpha

Remarks To change the current filter type, refer to “:FILTer” on page 218.

:FILTer:BBT

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:FILTer:BBT <val>
[:SOURce]:RADio:CDMA:ARB:FILTer:BBT?
```

This command changes the bandwidth-multiplied-by-bit-time (BbT) filter parameter.

The filter BbT value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +5.00000000E–001

Range 0.000–1.000

Key Entry Filter BbT

Remarks This command is effective only after choosing a Gaussian filter. It does not have an effect on other types of filters.

To change the current filter type, refer to “:FILTer” on page 218.

:FILTer:CHANnel

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:FILTer:CHANnel EVM|ACP
[:SOURce]:RADio:CDMA:ARB:FILTer:CHANnel?
```

This command optimizes the Nyquist and root Nyquist filters to minimize error vector magnitude (EVM) or to minimize adjacent channel power (ACP).

EVM This choice provides the most ideal passband.

ACP This choice improves stopband rejection.

***RST** EVM

Key Entry **Optimize FIR For EVM ACP**

Remarks To change the current filter type, refer to ":FILTer" on page 218.

:HEADer:CLEar

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:HEADer:CLEar
```

This command clears the header information from the file header used by this modulation format.

Key Entry **Clear Header**

Remarks The **CDMA Off On** softkey must be set to On for this command to function.

:HEADer:SAVE

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:HEADer:SAVE
```

This command saves the header information to the file header used by this modulation format.

Key Entry **Save Setup To Header**

Remarks The **CDMA Off On** softkey must be set to On for this command to function.

:IQMap

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:IQMap NORMal|INVerted
[:SOURce]:RADio:CDMA:ARB:IQMap?
```

This command selects whether the Q output will be normal or inverted.

NORMal This choice selects normal polarity.

INVerted This choice inverts the internal Q signal.

***RST** NORM

Key Entry **I/Q Mapping Normal Invert**

Remarks Inverting the Q output inverts the RF spectrum after the modulation.

:IQ:MODulation:ATTen

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:IQ:MODulation:ATTen <val>
[:SOURce]:RADio:CDMA:ARB:IQ:MODulation:ATTen?
```

This command attenuates the I/Q signals being modulated through the signal generator RF path.

The variable <val> is expressed in units of decibels (dB).

***RST** +2.00000000E+000

Range 0–40

Key Entry **Modulator Atten Manual Auto**

:IQ:MODulation:ATTen:AUTO

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:IQ:MODulation:ATTen:AUTO ON|OFF|1|0
[:SOURce]:RADio:CDMA:ARB:IQ:MODulation:ATTen:AUTO?
```

This command enables or disables the I/Q attenuation auto mode.

ON (1) This choice enables the attenuation auto mode which optimizes the modulator attenuation for the current conditions.

OFF (0) This choice holds the attenuator at its current setting or at a selected value. Refer to ":IQ:MODulation:ATTen" on page 221 for setting the attenuation value.

***RST** 1

Key Entry **Modulator Atten Manual Auto**

:IQ:MODulation:FILTer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:IQ:MODulation:FILTer 2.1e6|40e6|THRough
[:SOURce]:RADio:CDMA:ARB:IQ:MODulation:FILTer?
```

This command enables you to select a filter or through path for I/Q signals modulated onto the RF carrier. Selecting a filter using this command will automatically set ":IQ:MODulation:ATTen:AUTO" on page 221 to OFF(0) mode.

2.1E6 This choice applies a 2.1 MHz baseband filter to the I/Q signals.

40E6 This choice applies a 40 MHz baseband filter to the I/Q signals.

THRough This choice bypasses filtering.

***RST** THR

Key Entry **2.100 MHz** **40.000 MHz** **Through**

:IQ:MODulation:FILTer:AUTO

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:IQ:MODulation:FILTer:AUTO ON|OFF|1|0
[:SOURce]:RADio:CDMA:ARB:IQ:MODulation:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals modulated onto the RF carrier.

ON(1) This choice will automatically select a digital modulation filter.

OFF(0) This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to ":IQ:MODulation:FILTer" on page 303 for selecting a filter or through path.

***RST** 1

Key Entry **I/Q Mod Filter Manual Auto**

:MDEStination:AAMPlitude

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:MDEStination:AAMPlitude NONE|M1|M2|M3|M4
```

```
[:SOURce]:RADio:CDMA:ARB:MDEStination:AAMPlitude?
```

This command routes the selected marker to the Alternate Amplitude function. The `NONE` parameter clears the marker for the Alternate Amplitude function.

***RST**	NONE				
Key Entry	**None**	**Marker 1**	**Marker 2**	**Marker 3**	**Marker 4**

:MDEStination:ALCHold

Supported E4438C with Option 401

CAUTION Incorrect automatic level control (ALC) sampling can create a sudden unleveled condition that may create a spike in the RF output potentially damaging a DUT or connected instrument. Ensure that you set markers to let the ALC sample over an amplitude that accounts for the high power levels within the signal.

```
[:SOURce]:RADio:CDMA:ARB:MDEStination:ALCHold NONE|M1|M2|M3|M4
[:SOURce]:RADio:CDMA:ARB:MDEStination:ALCHold?
```

This command enables or disables the marker ALC hold function for the selected marker. For setting markers, see ":MARKer:[SET]" on page 306.

Use the ALC hold function when you have a waveform signal that has idle periods, or when the increased dynamic range encountered with RF blanking is not desired. The ALC leveling circuitry responds to the marker signal during the marker pulse (marker signal high), averaging the modulated signal level during this period.

The ALC hold function operates during the low periods of the marker signal. The marker polarity determines when the marker signal is high. For a positive polarity, this is during the marker points. For a negative polarity, this is when there are no marker points. For setting a marker's polarity, see ":MPOLarity:MARKer1|2|3|4" on page 226.

NOTE Do not use the ALC hold for more than 100 ms, because it can affect the waveform's output amplitude.

The marker signal has a minimum of a two-sample delay in its response relative to the waveform signal response. To compensate for the marker signal delay, offset marker points from the waveform sample point at which you want the ALC sampling to begin.

The ALC hold setting is part of the file header information, so saving the setting to the file header saves the current marker routing for the waveform file.

NOTE A waveform file that has unspecified settings in the file header uses the previous waveform's routing settings.

For more information on the marker ALC hold function, see the *E4428C/38C ESG Signal Generators User's Guide*. For setting the marker points, see ":MARKer:[SET]" on page 306.

NONE	This terminates the marker ALC hold function.
M1–M4	These are the marker choices. The ALC hold feature uses only one marker at a time.
***RST**	NONE

Example

```
:RAD:AWGB:ARB:MDES:ALCH M1
```

The preceding example routes marker 1 to the ALC Hold function.

Key Entry	**None**	**Marker 1**	**Marker 2**	**Marker 3**	**Marker 4**

Remarks N/A

:MDEStination:PULSe

Supported E4438C with Option 401

CAUTION The pulse function incorporates ALC hold. Incorrect automatic level control (ALC) sampling can create a sudden unleveled condition that may create a spike in the RF output potentially damaging a DUT or connected instrument. Ensure that you set markers to let the ALC sample over an amplitude that accounts for the high power levels within the signal.

```
[:SOURce]:RADio:ARB:MDEStination:PULSe NONE|M1|M2|M3|M4
[:SOURce]:RADio:ARB:MDEStination:PULSe?
```

This command enables or disables the marker pulse/RF blanking function for the selected marker.

This function automatically uses the ALC hold function, so there is no need to select both the ALC hold and the pulse/RF blanking for the same marker.

NOTE Do not use ALC hold for more than 100 ms, because it can affect the waveform's output amplitude.

The signal generator blanks the RF output when the marker signal goes low. The marker polarity determines when the marker signal is low. For a positive polarity, this is during the marker points. For a negative polarity, this is when there are no marker points. For setting a marker's polarity, see ":MPOLarity:MARKer1|2|3|4" on page 226.

NOTE Set marker points prior to using this function. Enabling this function without setting marker points may create a continuous low or high marker signal, depending on the marker polarity. This causes either no RF output or a continuous RF output. See ":MARKer:[SET]" on page 306 for setting the marker points.

The marker signal has a minimum of a two-sample delay in its response relative to the waveform signal response. To compensate for the marker signal delay, offset marker points from the waveform sample point at which you want the RF blanking to begin. The RF blanking setting is part of the file header information, so saving the setting to the file header saves the current marker routing for the waveform file.

NOTE A waveform file that has unspecified settings in the file header uses the previous waveform's routing settings. This could create the situation where there is no RF output signal, because the previous waveform used RF blanking.

For more information on the marker RF blanking function, see the *E4428C/38C ESG Signal Generators User's Guide*.

NONE This terminates the marker RF blanking/pulse function.

M1–M4 These are the marker choices. The RF blanking/pulse feature uses only one marker at a time.

Example

```
:RAD:ARB:MDES:PULS M2
```

The preceding example routes marker 2 to Pulse/RF Blanking.

***RST** NONE

Key Entry **None** **Marker 1** **Marker 2** **Marker 3** **Marker 4**

:MPOLarity:MARKer1|2|3|4

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:MPOLarity:MARKer1|2|3|4 NEGative|POSitive
[:SOURce]:RADio:CDMA:ARB:MPOLarity:MARKer1|2|3|4?
```

This command sets the polarity for the selected marker. For a positive marker polarity, the marker signal is high during the marker points. For a negative marker polarity, the marker signal is high during the period of no marker points.

***RST** POS

Key Entry **Marker 1 Polarity Neg Pos** **Marker 2 Polarity Neg Pos** **Marker 3 Polarity Neg Pos**

Marker 4 Polarity Neg Pos

:OSAMple

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:OSAMple <val>
[:SOURce]:RADio:CDMA:ARB:OSAMple?
```

This command sets the oversampling ratio (number of filter taps per symbol) for CDMA modulation.

***RST** +5

Range 2–8

Key Entry **Oversample Ratio**

Remarks The upper limit of the oversample ratio is adjusted based on the waveform length and chip rate.

Using larger oversample ratios result in more completely filtered images, but this action also uses up more waveform memory.

The maximum oversample ratio is the smaller of 8, 40 Mcps/Chip Rate, or 32/Waveform Length (number of CDMA short codes).

:REFerence:EXTernal:FREQuency

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:REFerence:EXTernal:FREQuency <val>
[:SOURce]:RADio:CDMA:ARB:REFerence:EXTernal:FREQuency?
```

This command allows you to enter the frequency of the applied external reference.

The variable <val> is expressed in units of Hertz (Hz–MHz).

***RST** +1.00000000E+007

Range 2.5E5–1E8

Key Entry **Reference Freq**

Remarks The value specified by this command is effective only when you are using an external ARB reference applied to the BASEBAND GEN REF IN rear panel connector.

To specify external as the ARB reference source type, refer to ":REFerence[:SOURce]" on page 227.

:REFerence[:SOURce]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:REFerence[:SOURce] INTernal|EXTernal
[:SOURce]:RADio:CDMA:ARB:REFerence[:SOURce]?
```

This command selects either an internal or external reference for the waveform clock.

***RST** INT

Key Entry **ARB Reference Ext Int**

Remarks If the EXTernal choice is selected, the external frequency value *must* be entered and the signal must be applied to the BASEBAND GEN REF IN rear panel connector.

Refer to ":REFerence:EXTernal:FREQuency" on page 226 to enter the external reference frequency.

:RETRigger

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:RETRigger ON|OFF|IMMediate
[:SOURce]:RADio:CDMA:ARB:RETRigger?
```

This command enables or disables the ARB retriggering mode; the retrigger mode controls how the retriggering function performs while a waveform is playing.

ON(1) This choice specifies that if a trigger occurs while a waveform is playing, the waveform will retrigger at the end of the current waveform sequence and play once more.

OFF(0) This choice specifies that if a trigger occurs while a waveform is playing, the trigger will be ignored.

IMMediate	This choice specifies that if a trigger occurs while a waveform is playing, the waveform will reset and replay from the start immediately upon receiving a trigger.
***RST**	ON
Key Entry	**On** **Off** **Immediate**

:SCLock:RATE

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:SCLock:RATE <val>
[:SOURce]:RADio:CDMA:ARB:SCLock:RATE?
```

This command sets the sample clock rate for the CDMA modulation format.

The variable <val> is expressed in units of hertz.

***RST**	+1.00000000E+008
Range	1–1E8
Key Entry	**ARB Sample Clock**
Remarks	The modulation format should be active before executing this command. If this command is executed before the modulation format is active, the entered value will be overridden by a calculated factory default value. Refer to “[:STATe]” on page 239 to activate the modulation format.

:SETup

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:SETup FWD9|FWD32|FWD64|PILot|REVerse|MCARrier|
"<file name>"
[:SOURce]:RADio:CDMA:ARB:SETup?
```

This command selects a pre-defined CDMA channel setup or multicarrier, and turns multicarrier off or on (see the MCARrier choice description).

FWD9	This CDMA setup consists of 9 forward channels (pilot, paging, sync, and 6 traffic channels) at IS-97-defined power levels.
FWD32	This CDMA setup consists of 32 forward channels (pilot, paging, sync, and 29 traffic channels) at IS-97-defined power levels.
FWD64	This CDMA setup consists of 64 forward channels (pilot, 7 paging, sync, and 55 traffic channels) at IS-97-defined power levels.
PILot	This choice selects single pilot channel.

REVerse	A single reverse link traffic channel.
MCARrier	This choice selects multicarrier and turns it on. Selecting any other setup such as FWD9 or FWD64 turns multicarrier off. To select the multicarrier setup, see ":SETup:MCARrier" on page 230.
***RST**	FWD9
Key Entry	**9 Ch Fwd** **32 Ch Fwd** **64 Ch Fwd** **Pilot** **Reverse** **Multicarrier Off On** **Multicarrier Off On** **Custom CDMA State**
Remarks	Refer to "File Name Variables" on page 13 for information on the file name syntax.

:SETup:CHANnel

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:SETup:CHANnel IS97|EQUal|SCALe|NONE {,PILot|
SYNC|PAGing|TRAFfic,<walsh_value>,<power_value>,<pn_offset>,RANDom|
<data_value>}
[:SOURce]:RADio:CDMA:ARB:SETup:CHANnel?
```

This command defines the channel parameters of the CDMA signal. This allows for customizing of the channel type, the channel parameters, and the data value.

The variable <power_value> is expressed in units of decibels (dB).

IS97	This choice sets the channel power levels to IS-97-defined power levels.
EQUAL	This choice sets the channel power levels so that all channels are of equal power and the total power equals 0 dBm.
SCALe	This choice scales all of the current channel powers so that the total power equals 0 dB while keeping the previous power ratios between the individual channels.
NONE	This choice bypasses the power level setting.
PILot	This choice selects a single traffic channel.
SYNC	This choice selects a sync channel.
PAGing	This choice selects a paging channel.
TRAFfic	This choice selects a traffic channel.
RANDom	This choice selects a randomly generated data value.

The channel type, walsh code, power, PN offset, and data values are returned when a query is initiated. The output format is as follows:

```
<channel type>,<walsh_value>,<power>,<pn_offset>,<data_value>
```

*RST	*Channel #*	*Channel Type*	*Walsh Code*	*Power*	*PN Offset*	*Data*
	1	PIL	+0	-7.00000000E+000	+0	+0
	2	PAG	+1	-7.26000023E+000	+0	RAND
	3	TRAF	+8	-1.02600002E+001	+0	RAND
	4	TRAF	+9	-1.02600002E+001	+0	RAND
	5	TRAF	+10	-1.02600002E+001	+0	RAND
	6	TRAF	+11	-1.02600002E+001	+0	RAND
	7	TRAF	+12	-1.02600002E+001	+0	RAND
	8	TRAF	+13	-1.02600002E+001	+0	RAND
	9	SYNC	+32	-1.02600002E+001	+0	RAND

Range <*power_value*>: –40 to 0 <*walsh_value*>: 0–63 <*pn_offset*>: 0–511

Key Entry **IS-97 Levels** **Equal Powers** **Scale to 0dB** **Sync** **Pilot** **Paging** **Traffic**

:SETup:MCARrier

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:SETup:MCARrier CAR3|CAR4|"<file name>"
[:SOURce]:RADio:CDMA:ARB:SETup:MCARrier?
```

This command selects a pre-defined or user-defined multicarrier CDMA setup.

CAR3 This choice selects three 9 channel forward carriers with a power level of 0.00 dB, the first with a –1.25 MHz frequency offset, the second with no frequency offset, and the third with +1.25 MHz frequency offset.

CAR4 This choice selects four 9 channel forward carriers with a power level of 0.00 dB, the first with a –1.875 MHz frequency offset, the second with a –625 kHz frequency offset, the third with +625 kHz frequency offset, and the fourth with a +1.875 MHz frequency offset.

`"<file name>"` This choice selects a file consisting of the user-defined number of channel forward carriers, power levels, and frequency offsets.

***RST** CAR3

Key Entry **3 Carriers** **4 Carriers** **Custom CDMA Multicarrier**

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:SETup:MCARrier:STORe

Supported E4438C with Option 401

`[:SOURce]:RADio:CDMA:ARB:SETup:MCARrier:STORe "<file name>"`

This command stores the current multicarrier setup information.

The stored file contains information including the digital modulation format, number of carriers, frequency spacing, and power settings for the multicarrier setup.

Key Entry **Store Custom Multicarrier**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:SETup:MCARrier:TABLe

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:SETup:MCARrier:TABLe {FWD9|FWD32|FWD64|PILot|
CUSTom,"<file name>"|"",<freq_offset>,<power>}
[:SOURce]:RADio:CDMA:ARB:SETup:MCARrier:TABLe?
```

This command defines the multicarrier CDMA waveform.

The variable <freq_offset> is expressed in units of Hertz (kHz to MHz).

The variable <power> is expressed in units of decibels (dB).

The carrier type, carrier name, frequency offset, and power level are returned when a query is initiated. The output format is as follows:

`<carrier type>,<carrier_name>,<freq_offset>,<power>`

FWD9 This CDMA setup consists of 9 forward channels (pilot, paging, sync, and 6 traffic channels) at IS-97-defined power levels.

FWD32 This CDMA setup consists of 32 forward channels (pilot, paging, sync, and 29 traffic channels) at IS-97-defined power levels.

FWD64 This CDMA setup consists of 64 forward channels (pilot, 7 paging, sync, and 55 traffic channels) at IS-97-defined power levels.

PILot This choice selects single pilot channel.

`CUSTom,"<file name>"` This choice selects a custom user-defined CDMA setup.

`""` A null string, entered for any non-custom carrier.

***RST** carrier type: FWD9 <freq_offset>: +1.25000000E+006

<power>: +0.00000000E+000

Range <freq_offset>: –7.5E6 to 7.5E6 <power>: –40 to 0

Key Entry **9 Ch Fwd** **32 Ch Fwd** **64 Ch Fwd** **Pilot** **Custom CDMA State**

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax. To store a multicarrier setup refer to “:SETup:MCARrier:STORe” on page 231

The file name specified must be a single carrier CDMA file.

:SETup:STORe

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:SETup:STORe "<file name>"
```

This command stores the current custom CDMA state, using a designated file name, to the signal generator non-volatile memory.

Along with the contents of the CDMA channel table editor (channel types, Walsh code, power levels, PN offset, and data), this command stores the following information to the signal generator non-volatile memory:

FIR filter
FIR filter file name
FIR filter alpha
FIR filter BbT
FIR filter channel (EVM or ACP)
chip rate
waveform length
oversample ratio
ARB reference clock source (internal or external)
ARB reference clock frequency

Key Entry **Store Custom CDMA State**

Remarks Recall the stored file by executing the following command:

```
[:SOURce]:RADio:CDMA:ARB:SETup: "<file name>"
```

Refer to “File Name Variables” on page 13 for information on the file name syntax.

:TRIGger:TYPE

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:TRIGger:TYPE CONTinuous|SINGle|GATE
[:SOURce]:RADio:CDMA:ARB:TRIGger:TYPE?
```

This command sets the trigger mode (type) that controls the waveform's playback.

Triggers control the playback by telling the ESG when to play the modulating signal (waveform). Depending on the trigger settings for the ESG, the waveform playback can occur once, continuously, or the ESG may start and stop playing the waveform repeatedly (GATE mode).

A trigger signal comprises both positive and negative signal transitions (states), which are also called high and low periods. You can configure the ESG to trigger on either state of the trigger signal. It is common to have multiple triggers, also referred to as trigger occurrences or events, occur when the signal generator requires only a single trigger. In this situation, the ESG recognizes the first trigger and ignores the rest.

When you select a trigger mode, you may lose the signal (carrier plus modulating) from the RF output until you trigger the waveform. This is because the ESG sets the I and Q signals to zero volts prior to the first trigger event, which suppresses the carrier. After the first trigger event, the waveform's final I and Q levels determine whether you will see the carrier signal or not (zero = no carrier, other values = carrier visible). At the end of most files, the final I and Q points are set to a value other than zero.

There are four parts to configuring the trigger:

- Choosing the trigger type, which controls the waveform's transmission.
- Setting the waveform's response to triggers:
  - — CONTinuous, see ":TRIGger:TYPE:CONTinuous[:TYPE]" on page 234
  - — SINGle, see ":RETRigger" on page 227
  - — GATE, selecting the mode also sets the response
- Selecting the trigger source (see ":TRIGger[:SOURce]" on page 235), which determines how the ESG receives its trigger signal, internally or externally. The GATE choice requires an external trigger.
- Setting the trigger polarity when using an external source:
  - — CONTinuous and SINGle see ":TRIGger[:SOURce]:EXTernal:SLOPe" on page 237
  - — GATE, see ":TRIGger:TYPE:GATE:ACTive" on page 235

For more information on triggering, see the *E4428C/38C ESG Signal Generators User's Guide*.

The following list describes the trigger type command choices:

CONTinuous Upon triggering, the waveform repeats continuously.

SINGle	Upon triggering, the waveform segment or sequence plays once.
GATE	An external trigger signal repeatedly starts and stops the waveform's playback (transmission). The time duration for playback depends on the duty period of the trigger signal and the gate polarity selection (see ":TRIGger:TYPE:GATE:ACTive" on page 235). The waveform plays during the inactive state and stops during the active polarity selection state. The active state can be set high or low. The gate mode works only with an external trigger source.

NOTE The ARB gating behavior described above is opposite to the gating behavior for real-time custom mode.

***RST** CONT

Key Entry **Continuous** **Single** **Gated**

:TRIGger:TYPE:CONTinuous[:TYPE]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:TRIGger:TYPE:CONTinuous[:TYPE] FREE|TRIGger|
RESet
[:SOURce]:RADio:CDMA:ARB:TRIGger:TYPE:CONTinuous[:TYPE]?
```

This commands selects the waveform's response to a trigger signal while using the continuous trigger mode.

For more information on triggering and to select the continuous trigger mode, see ":TRIGger:TYPE" on page 233.

The following list describes the waveform's response to each of the command choices:

FREE	Turning the ARB format on immediately triggers the waveform. The waveform repeats until you turn the format off, select another trigger, or choose another waveform file.
TRIGger	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously until you turn the format off, select another trigger, or choose another waveform file.
RESet	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously. Subsequent triggers reset the waveform to the beginning. For a waveform sequence, this means to the beginning of the first segment in the sequence.

***RST**	FREE		
Key Entry	**Free Run**	**Trigger & Run**	**Reset & Run**

:TRIGger:TYPE:GATE:ACTive

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:TRIGger:TYPE:GATE:ACTive LOW|HIGH
[:SOURce]:RADio:CDMA:ARB:TRIGger:TYPE:GATE:ACTive?
```

This command selects the active state (gate polarity) of the gate while using the gating trigger mode.

The LOW and HIGH selections correspond to the low and high states of an external trigger signal. For example, when you select HIGH, the active state occurs during the high of the trigger signal. When the active state occurs, the ESG stops the waveform playback at the last played sample point, then restarts the playback at the next sample point when the inactive state occurs. For more information on triggering and to select gating as the trigger mode, see ":TRIGger:TYPE" on page 233.

The following list describes the ESG's gating behavior for the polarity selections:

LOW The waveform playback stops when the trigger signal goes low (active state) and restarts when the trigger signal goes high (inactive state).

HIGH The waveform playback stops when the trigger signal goes high (active state) and restarts when the trigger signal goes low (inactive state).

***RST** HIGH

Key Entry **Gate Active Low High**

:TRIGger[:SOURce]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:TRIGger[:SOURce] KEY|EXT|BUS
[:SOURce]:RADio:CDMA:ARB:TRIGger[:SOURce]?
```

This command sets the trigger source.

For more information on triggering, see ":TRIGger:TYPE" on page 233. The following list describes the command choices:

KEY This choice enables manual triggering by pressing the front-panel **Trigger** hardkey.

EXT An externally applied signal triggers the waveform. This is the only choice that works with gating. The following conditions affect an external trigger:

- The input connector selected for the trigger signal. You have a choice between the rear-panel PATTERN TRIG IN connector or the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector. To make the connector selection, see ":TRIGger[:SOURce]:EXTernal[:SOURce]" on page 238.

  For more information on the connectors and on connecting the cables, see the *E4428C/38C ESG Signal Generators User's Guide*.

- The trigger signal polarity:

  — gating mode, see ":TRIGger:TYPE:GATE:ACTive" on page 235
  — continuous and single modes, see ":TRIGger[:SOURce]:EXTernal:SLOPe" on page 237

- The time delay between when the ESG receives a trigger and when the waveform responds to the trigger. There are two parts to setting the delay:

  — setting the amount of delay, see ":TRIGger[:SOURce]:EXTernal:DELay" on page 236
  — turning the delay on, see ":TRIGger[:SOURce]:EXTernal:DELay:STATe" on page 237

BUS — This choice enables triggering over the GPIB or LAN using the `*TRG` or `GET` commands or the AUXILIARY INTERFACE (RS-232) using the `*TRG` command.

***RST** KEY

Key Entry **Trigger Key** **Ext** **Bus**

:TRIGger[:SOURce]:EXTernal:DELay

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:TRIGger[:SOURce]:EXTernal:DELay <val>
[:SOURce]:RADio:CDMA:ARB:TRIGger[:SOURce]:EXTernal:DELay?
```

This command sets the amount of time to delay the ESG's response to an external trigger.

The delay is a path (time) delay between when the ESG receives the trigger and when it responds to the trigger. For example, configuring a trigger delay of two seconds, causes the ESG to wait two seconds after receipt of the trigger before the ESG plays the waveform.

The delay does not occur until you turn it on (see ":TRIGger[:SOURce]:EXTernal:DELay:STATe" on page 237). You can set the delay value either before or after turning it on.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 235.

The unit of measurement for the variable <val> is in seconds (nsec–sec).

***RST** +1.00000000E–003

Range 1E–8 to 4E1

Key Entry **Ext Delay Time**

:TRIGger[:SOURce]:EXTernal:DELay:STATe

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:TRIGger[:SOURce]:EXTernal:DELay:STATe ON|OFF|
1|0
[:SOURce]:RADio:CDMA:ARB:TRIGger[:SOURce]:EXTernal:DELay:STATe?
```

This command enables or disables the operating state of the external trigger delay function.

For setting the delay time, see ":TRIGger[:SOURce]:EXTernal:DELay" on page 236, and for more information on configuring an external source, see":TRIGger[:SOURce]" on page 235.

***RST** 0

Key Entry **Ext Delay Off On**

:TRIGger[:SOURce]:EXTernal:SLOPe

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:TRIGger[:SOURce]:EXTernal:SLOPe POSitive|
NEGative
[:SOURce]:RADio:CDMA:ARB:TRIGger[:SOURce]:EXTernal:SLOPe?
```

This command sets the polarity for an external trigger signal while using the continuous, single triggering mode. To set the polarity for gating, see ":TRIGger:TYPE:GATE:ACTive" on page 235.

The POSitive and NEGative selections correspond to the high (positive) and low (negative) states of the external trigger signal. For example, when you select POSitive, the waveform responds (plays) during the high state of the trigger signal. When the ESG receives multiple trigger occurrences when only one is required, the signal generator uses the first trigger and ignores the rest.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 235.

***RST** NEG

Key Entry **Ext Polarity Neg Pos**

:TRIGger[:SOURce]:EXTernal[:SOURce]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:TRIGger[:SOURce]:EXTernal[:SOURce] EPT1|EPT2|
EPTRIGGER1|EPTRIGGER2
[:SOURce]:RADio:CDMA:ARB:TRIGger[:SOURce]:EXTernal[:SOURce]?
```

This command selects which PATTERN TRIG IN connection the ESG uses to accept an externally applied trigger signal when external is the trigger source selection.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 235. For more information on the rear-panel connectors, see the *E4428C/38C ESG Signal Generators User's Guide*.

The following list describes the command choices:

EPT1	This choice is synonymous with EPTRIGGER1 and selects the PATTERN TRIG IN rear-panel connector.
EPT2	This choice is synonymous with EPTRIGGER2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.
EPTRIGGER1	This choice is synonymous with EPT1 and selects the PATTERN TRIG IN rear-panel connector.
EPTRIGGER2	This choice is synonymous with EPT2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.

***RST** EPT1

Key Entry **Patt Trig In 1** **Patt Trig In 2**

:WLENgth

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:WLENgth <val>
[:SOURce]:RADio:CDMA:ARB:WLENgth?
```

This command specifies the waveform length (in short codes).

***RST** +1

Range 1–6

Key Entry **Waveform Length**

Remarks The upper limit is adjusted based on the oversample ratio to fit the signal within the available memory.

The maximum waveform length is 32/oversample ratio.

[:STATe]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB[:STATe] ON|OFF|1|0
[:SOURce]:RADio:CDMA:ARB[:STATe]?
```

This command enables or disables the CDMA modulation format.

Executing the command `[:SOURce]:RADio:CDMA:ARB[:STATe] ON` sets up the internal hardware to generate the currently selected CDMA signal selection. This also activates the I/Q state and sets the I/Q source to internal.

ON (1) This choice sets up the internal hardware to generate the currently selected CDMA signal selection. This also activates the I/Q state and sets the I/Q source to internal.

OFF (0) This choice disables the CDMA modulation format.

***RST** 0

Key Entry **CDMA Off On**

Remarks The enabled modulation is not present on RF carrier until you have activated the modulation by executing the command `:OUTPut:MODulation[:STATe] ON`.

Overriding the I/Q state and I/Q source functions can be achieved by using the I/Q menu.

CDMA2000 ARB Subsystem–Option 401 ([:SOURce]:RADio:CDMA2000:ARB)

:CLIPping:I

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:CLIPping:I <val>
[:SOURce]:RADio:CDMA2000:ARB:CLIPping:I?
```

This command clips (limits) the modulation level of the waveform’s I component to a percentage of full scale.

The variable <val> is expressed in units of percent.

***RST** +1.00000000E+002

Range 10–100

Key Entry **Clip |I| To**

:CLIPping:POSition

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:CLIPping:POSition PRE|POST
[:SOURce]:RADio:CDMA2000:ARB:CLIPping:POSition?
```

This command specifies whether a waveform is clipped before (PRE) or after (POST) FIR filtering.

***RST** PRE

Key Entry **Clip At PRE POST FIR Filter**

:CLIPping:Q

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:CLIPping:Q <val>
[:SOURce]:RADio:CDMA2000:ARB:CLIPping:Q?
```

This command clips (limits) the modulation level of the waveform’s Q component to a percentage of full scale.

The variable <val> is expressed in units of percent.

***RST** +1.00000000E+002

Range 10–100

Key Entry **Clip |Q| To**

:CLIPping:TYPE

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:CLIPping:TYPE IJQ|IORQ
[:SOURce]:RADio:CDMA2000:ARB:CLIPping:TYPE?
```

This command selects either `IJQ` or `IORQ` as the clipping type.

IJQ This choice clips (circular clipping) the combined I and Q waveform.

IORQ This choice independently clips (rectangular clipping) I and Q components of the waveform. I and Q can be clipped to different levels using this mode.

***RST** IORQ

Key Entry **Clipping Type |I+jQ| |I|,|Q|**

:CLIPping[:IJQ]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:CLIPping[:IJQ] <val>
[:SOURce]:RADio:CDMA2000:ARB:CLIPping[:IJQ]?
```

This command clips (limits) the modulation level of the combined I and Q waveform to a percentage of full scale.

The variable <val> is expressed in units of percent.

***RST** +1.00000000E+002

Range 10–100

Key Entry **Clip |I+jQ| To**

:IQ:EXTernal:FILTer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:IQ:EXTernal:FILTer 40e6|THRough
[:SOURce]:RADio:CDMA2000:ARB:IQ:EXTernal:FILTer?
```

This command selects the filter or through path for I/Q signals routed to the rear panel I and Q outputs. Selecting a filter using this command will automatically set ":IQ:EXTernal:FILTer:AUTO" on page 242 to OFF(0) mode.

40e6 This choice applies a 40 MHz baseband filter.

THRough   This choice bypasses filtering.

***RST**   THR

Key Entry   **40.000 MHz**   **Through**

:IQ:EXTernal:FILTer:AUTO

Supported   E4438C with Option 401

```
[:SOURce]:RADio:ARB:IQ:EXTernal:FILTer:AUTO ON|OFF|1|0
[:SOURce]:RADio:ARB:IQ:EXTernal:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals routed to the rear panel I/Q outputs.

ON(1)   This choice will automatically select a digital modulation filter optimized for the current signal generator settings.

OFF(0)   This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to ":IQ:EXTernal:FILTer" on page 241 for selecting a filter or through path.

***RST**   1

Key Entry   **I/Q Output Filter Manual Auto**

:FILTer

Supported   E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:FILTer RNYQuist|NYQuist|GAUSsian|RECTangle|
IS95|IS95_EQ|IS95_MOD|IS95_MOD_EQ|AC4Fm|WCDMA|IS2000SR3DS|UGGaussian|
"<user FIR>"
[:SOURce]:RADio:CDMA2000:ARB:FILTer?
```

This command selects the pre-modulation filter type.

IS95   This choice selects a filter that meets the criteria of the IS-95 standard.

IS95_EQ   This choice selects a filter which is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard. This filter is only used for IS-95 baseband filtering.

IS95_MOD   This choice selects a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.

IS95_MOD_EQ   This choice selects a filter which is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function

	(for improved adjacent channel performance), with lower passband rejection.
WCDMa	This choice selects a 0.22 Nyquist filter optimized for ACP.
AC4Fm	This choice selects the Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.
IS2000SR3DS	This choice selects an IS-2000 standard, spread rate 3 direct spread filter.
UGGaussian	This choice selects a backwards compatible GSM Gaussian filter (Gaussian filter with a fixed BbT value of 0.300) for the ESG E44xxB Option UN3 or UN4.
`"<user FIR>"`	This variable is any FIR filter file that you have stored in memory. The variable needs no directory path indicating the location of the file, such as `FIR:` or `/USER/FIR`. The command assumes the FIR directory. Refer to "File Name Variables" on page 13 for more information on file names.
***RST**	`IS95_MOD_EQ`
Key Entry	**Root Nyquist** **Nyquist** **Gaussian** **Rectangle** **IS-95** **IS-95 w/EQ** **IS-95 Mod** **IS-95 Mod w/EQ** **APCO 25 C4FM** **WCDMA** **UN3/4 GSM Gaussian** **IS-2000 SR3 DS** **User FIR**

:FILTer:ALPHa

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:FILTer:ALPHa <val>
[:SOURce]:RADio:CDMA2000:ARB:FILTer:ALPHa?
```

This command changes the Nyquist or root Nyquist filter alpha value.

The filter alpha value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST**	+5.00000000E–001
Range	0.000–1.000
Key Entry	**Filter Alpha**
Remarks	To change the current filter type, refer to ":FILTer" on page 242.

:FILTer:BBT

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:FILTer:BBT <val>
[:SOURce]:RADio:CDMA2000:ARB:FILTer:BBT?
```

This command changes the bandwidth-multiplied-by-bit-time (BbT) filter parameter.

The filter BbT value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +5.00000000E–001

Range 0.000–1.000

Key Entry **Filter BbT**

Remarks This command is effective only after choosing a Gaussian filter. It does not have an effect on other types of filters.

To change the current filter type, refer to ":FILTer" on page 242.

:FILTer:CHANnel

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:FILTer:CHANnel EVM|ACP
[:SOURce]:RADio:CDMA2000:ARB:FILTer:CHANnel?
```

This command optimizes the Nyquist and root Nyquist filters to minimize error vector magnitude (EVM) or to minimize adjacent channel power (ACP).

EVM This choice provides the most ideal passband.

ACP This choice improves stopband rejection.

***RST** EVM

Key Entry **Optimize FIR For EVM ACP**

Remarks To change the current filter type, refer to ":FILTer" on page 242.

:HEADer:CLEar

Supported E4438C with Option 401

`[:SOURce]:RADio:CDMA2000:ARB:HEADer:CLEar`

This command clears the header information from the file header used by this modulation format.

Key Entry **Clear Header**

Remarks The **CDMA2000 Off On** softkey must be set to On for this command to function.

:HEADer:SAVE

Supported E4438C with Option 401

`[:SOURce]:RADio:CDMA2000:ARB:HEADer:SAVE`

This command saves the header information to the file header used by this modulation format.

Key Entry **Save Setup To Header**

Remarks The **CDMA2000 Off On** softkey must be set to On for this command to function.

:IQ:MODulation:ATTen

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:IQ:MODulation:ATTen <val>
[:SOURce]:RADio:CDMA2000:ARB:IQ:MODulation:ATTen?
```

This command attenuates the I/Q signals being modulated through the signal generator RF path.

The variable <val> is expressed in units of decibels (dB).

***RST** +2.00000000E+000

Range 0–40

Key Entry **Modulator Atten Manual Auto**

:IQ:MODulation:ATTen:AUTO

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:IQ:MODualtion:ATTen:AUTO ON|OFF|1|0
[:SOURce]:RADio:CDMA2000:ARB:IQ:MODulation:ATTen:AUTO?
```

This command enables or disables the I/Q attenuation auto mode.

ON (1) This choice enables the attenuation auto mode which optimizes the modulator attenuation for the current conditions.

OFF (0) This choice holds the attenuator at its current setting or at a selected value. Refer to “:IQ:MODulation:ATTen” on page 245 for setting the attenuation value.

***RST** 1

Key Entry **Modulator Atten Manual Auto**

:IQ:MODulation:FILTer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:IQ:MODulation:FILTer 2.1e6|40e6|THRough
[:SOURce]:RADio:CDMA2000:ARB:IQ:MODulation:FILTer?
```

This command enables you to select a filter or through path for I/Q signals modulated onto the RF carrier. Selecting a filter using this command will automatically set “:IQ:MODulation:FILTer:AUTO” on page 246 to OFF(0) mode.

2.1E6 This choice applies a 2.1 MHz baseband filter to the I/Q signals.

40E6 This choice applies a 40 MHz baseband filter to the I/Q signals.

THRough This choice bypasses filtering.

***RST** THR

Key Entry **2.100 MHz** **40.000 MHz** **Through**

:IQ:MODulation:FILTer:AUTO

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:IQ:MODulation:FILTer:AUTO ON|OFF|1|0
[:SOURce]:RADio:CDMA2000:ARB:IQ:MODulation:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals modulated onto the RF carrier.

ON(1) This choice will automatically select a digital modulation filter.

OFF(0)	This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to ":IQ:MODulation:FILTer" on page 246 for selecting a filter or through path.
***RST**	1
Key Entry	**I/Q Mod Filter Manual Auto**

:IQMap

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:IQMap NORMal|INVerted
[:SOURce]:RADio:CDMA2000:ARB:IQMap?
```

This command selects whether the Q output will be normal or inverted.

NORMal	This choice selects normal polarity.
INVerted	This choice inverts the internal Q signal.
***RST**	NORM
Key Entry	**I/Q Mapping Normal Invert**
Remarks	Inverting the Q output inverts the RF spectrum after the modulation.

:LINK

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:LINK FORWard|REVerse
[:SOURce]:RADio:CDMA2000:ARB:LINK?
```

This command selects the CDMA2000 forward or reverse link channel setup.

FORW	This choice selects a basestation to mobile configuration.
REV	This choice selects a mobile to basestation configuration.
***RST**	FORW
Key Entry	**Link Forward Reverse**

:LINK:FORWard:SETup

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup S1Pilot|S3DPilot|
S3MPilot|S19Chan|S3D9chan|S3M9chan|MCARrier|"<file name>"
[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup?
```

This command selects a previously defined channel configuration for the CDMA2000 forward link or multicarrier, and turns multicarrier off or on (see the MCARrier choice description).

S1Pilot	This choice selects a spread rate 1, pilot-channel setup.
S3DPilot	This choice selects a spread rate 3, direct spread, pilot-channel setup.
S3MPilot	This choice selects a spread rate 3, multicarrier spread, pilot-channel setup.
S19Chan	This choice selects a spread rate 1, 9-channel setup.
S3D9Chan	This choice selects a spread rate 3, direct spread, 9-channel setup.
S3M9Chan	This choice selects a spread rate 3, multicarrier spread, 9-channel setup.
MCARrier	This choice selects multicarrier and turns it on. Selecting any other setup such as S1Pilot or S3D9Chan turns multicarrier off. To select the multicarrier setup, see ":LINK:FORWard:SETup:MCARrier" .

***RST** S19C

Key Entry **Pilot** **9 Channel** **Spread Rate 1** **Spread Rate 3** **Multicarrier Off On**
Spreading Type Direct Mcarrier **Custom CDMA2000 Carrier**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:LINK:FORWard:SETup:MCARrier

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:MCARrier CAR2|CAR3|CAR4|
"<file name>"
[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:MCARrier?
```

This command defines the type of multicarrier CDMA2000 setup.

CAR2 This choice specifies the following standard 2-carrier setup:

Carrier 1: spread rate 3, direct spread, 9 channel; –2.5 MHz frequency offset; 0 dB power

Carrier 2: spread rate 3, direct spread, 9 channel; 2.5 MHz frequency offset; 0 dB power

CAR3 This choice specifies the following standard 3-carrier setup:

Carrier 1: spread rate 1, 9 channel; –1.25 MHz frequency offset; 0 dB power

Carrier 2: spread rate 1, 9 channel; 0 kHz frequency offset; 0 dB power

Carrier 3: spread rate 1, 9 channel; 1.25 MHz frequency offset; 0 dB power

CAR4 This choice specifies the following standard 2-carrier setup:

Carrier 1: spread rate 1, 9 channel; –1.875 MHz frequency offset; 0 dB power

Carrier 2: spread rate 1, 9 channel; –625 kHz frequency offset; 0 dB power

Carrier 3: spread rate 1, 9 channel; 625 kHz frequency offset; 0 dB power

Carrier 4: spread rate 1, 9 channel; 1.875 MHz frequency offset; 0 dB power

***RST** CAR2

Key Entry **2 SR3 Carriers** **3 Carriers** **4 Carriers** **Custom CDMA2000 Multicarrier**

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:LINK:FORWard:SETup:MCARrier:STORe

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:MCARrier:
STORe "<file name>"
```

This command stores the current multicarrier setup information.

The stored file contains information including the digital modulation format, number of carriers, frequency spacing, and power settings for the multicarrier setup.

Key Entry Store Custom Multicarrier

Remarks Recall stored files from memory by executing the following command:

```
[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:
MCARrier "<file name>"
```

Refer to “File Name Variables” on page 13 for information on the file name syntax.

:LINK:FORWard:SETup:MCARrier:TABLe

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:MCARrier:TABLe INIT|
APPend|<chan_num>,S1Pilot|S3DPilot|S3MPilot|S19Chan|S3D9chan|S3M9chan|
"<file name>",<freq_offset>,<power>
[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:MCARrier:
TABLe? <chan_num>
```

This command defines the multicarrier CDMA2000 waveform.

The variable <freq_offset> is expressed in units of Hertz (MHz).

The variable <power> is expressed in units of decibels (dB).

Channel type, frequency offset, and power level are returned when a query is initiated. The output format is as follows:

`<channel type>,<freq_offset>,<power>`

INIT	This choice clears the current information and creates a new one-row table, allowing for further definition using additional parameters.
APPend	This choice adds rows to an existing table. The maximum number of rows for one table is 25.
S1Pilot	This choice sets a single SR1 Pilot forward channel.
S3DPilot	This choice sets a single direct spread pilot forward channel.
S3MPilot	This choice sets a single SR3 multicarrier spread pilot forward channel.
S19Chan	This choice sets a SR1 9 forward channel.
S3D9chan	This choice sets a SR3 direct spread forward channel.
S3M9chan	This choice sets a SR3 multicarrier spread 9 forward channel.
***RST**	channel type: S3D9CHAN <freq_offset>: -2.50000000E+006 <power>: +0.00000000E+000
Range	<freq_offset>: –15E6 to 15E6 <power>: –40 to 0
Key Entry	**Select File** **Insert Row** **SR1 Pilot** **SR3 Direct Pilot** **SR3 Mcarrier Pilot** **SR3 Mcarrier Pilot** **SR1 9 Channel** **SR3 Direct 9 Channel** **SR3 Mcarrier 9 Channel** **Custom CDMA2000 Carrier**
Field Entry	`Freq Offset` `Power`
Remarks	Refer to “File Name Variables” on page 13 for information on the file name syntax.

:LINK:FORWard:SETup:MCARrier:TABLe:NCARriers

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:MCARrier:TABLe:
NCARriers?
```

This command queries the number of carriers specified for the multicarrier CDMA2000 waveform.

***RST** +2

:LINK:FORWard:SETup:STORe

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:STORe "<file name>"
```

This command stores the current custom CDMA2000 state, using a designated file name, to the signal generator memory.

Along with the contents of the CDMA2000 channel table editor (channel types, Walsh code, power levels, PN offset, and data), this command stores the following information to the signal generator memory:

FIR filter
FIR filter file name
FIR filter alpha
FIR filter BbT
FIR filter channel (EVM or ACP)
I/Q mapping
link
spread type
spread rate
ARB reference clock source (internal or external)
ARB reference clock frequency
clipping
multicarrier spacing
radio configuration

Key Entry **Store Custom CDMA State**

Remarks Recall this stored file by executing the following command:

```
[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:
SETup "<file name>"
```

Refer to "File Name Variables" on page 13 for information on the file name syntax.

:LINK:FORWard:SETup:TABLe:APPLy

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:TABLe:APPLy
```

This command generates a CDMA2000 signal based on the current values in the CDMA2000 channel setup table editor.

Key Entry Apply Channel Setup

:LINK:FORWard:SETup:TABLe:CHANnel

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:TABLe:CHANnel INIT|
APPend|<chan_num>,<chan_type>,<config>,<data_rate>,<walsh>,<power>,
<pn_offset>,RANDom|<data_val>
[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:TABLe:
CHANnel? <chan_num>
```

This command defines the channel parameters of the CDMA2000 signal.

The variable <power> is expressed in units of decibels (dB).

The variable <data_rate> is expressed in units bits per second (bps).

The channel type, configuration type, data rate, walsh code, power, pn offset, and data value are returned when a query is initiated. The output format is as follows:

<chan_type>,<config>,<data_rate>,<walsh>,<power>,<pn_offset>,<data_val>

INIT This choice clears the current information and creates a new one-row table, allowing for further definition using additional parameters.

APPend This choice adds rows to an existing table.

RANDom This choice selects a randomly generated data value.

<data_val> This variable specifies a specific data value.

***RST** channel type: PIL <config>: +3 <data_rate>: +3.84000000E+004

<walsh>: +0 <power>: -7.00000000E+000 <pn_offset>: +0

<data_val>: 0

Range <data_rate>: 1500–307200 <walsh>: 0–63 <*power*>: –40 to 0

<pn_offset>: 0–511 <data_val>: 0000000–11111111

Key Entry **Edit Channel Setup** **Insert Row** **Config** **Rate**

Walsh Code **PN Offset**

Remarks Queries initiated for this command must be followed by a specific channel number.

The above *RST value represents a query of channel one.

:LINK:FORWard:SETup:TABLe:NCHannels

Supported E4438C with Option 401

`[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:TABLe:NCHannels?`

This command queries the number of channels specified for the CDMA2000 link setup.

***RST** +9

:LINK:FORWard:SETup:TABLe:PADJust

Supported E4438C with Option 401

`[:SOURce]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:TABLe:PADJust EQUal|SCALe`

This command sets the code domain power (the relative power in each of the channels).

EQUal Sets all channels to equal power, and the total power to 0 dB.

SCALe Scales all of the current channel powers so that the total power equals 0 dB, keeping the previous power ratios between the individual channels.

Key Entry **Equal Powers** **Scale To 0dB**

:LINK:REVerse:RCONfig

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:RCONfig <val>
[:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:RCONfig?
```

This command sets the radio configuration for all reverse link channels.

***RST** +1

Range 1–4

Key Entry **Radio Config**

Remarks Changing the radio configuration results in changes to the channel data rate.

:LINK:REVerse:SETup

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup S1Pilot|S3Pilot|
S15Chan|S35Chan|S18Chan|"<file name>"
[:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup?
```

This command selects a previously defined channel configuration for the CDMA2000 reverse link.

S1Pilot	This choice selects a spread rate 1, pilot-channel setup.
S3Pilot	This choice selects a spread rate 3, pilot-channel setup.
S15Chan	This choice selects a spread rate 1, 5-channel setup.
S35Chan	This choice selects a spread rate 3, 5-channel setup.
S18Chan	This choice selects a spread rate 1, 8-channel setup.
***RST**	S15Chan
Key Entry	**Pilot** **5 Channel** **8 Channel** **Custom CDMA2000 State** **Spread Rate 1** **Spread Rate 3**
Remarks	Refer to "File Name Variables" on page 13 for information on the file name syntax.

:LINK:REVerse:SETup:STORe

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup:STORe "<file name>"
```

This command stores the current custom CDMA2000 state, using a designated file name, to the signal generator memory.

Along with the contents of the CDMA2000 channel table editor (channel types, Walsh code, power levels, PN offset, and data), this command stores the following information to the signal generator memory:

FIR filter
FIR filter file name
FIR filter alpha
FIR filter BbT
FIR filter channel (EVM or ACP)
I/Q mapping
link
spread type

spread rate
ARB reference clock source (internal or external)
ARB reference clock frequency
clipping
multicarrier spacing
radio configuration

Key Entry **Store Custom CDMA State**

Remarks Recall this stored file by executing the following command:

```
[:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:
SETup "<file name>"
```

Refer to “File Name Variables” on page 13 for information on the file name syntax.

:LINK:REVerse:SETup:TABLe:APPLy

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup:TABLe:APPLy
```

This command generates a CDMA2000 signal based on the current values in the CDMA2000 channel setup table editor.

Key Entry **Apply Channel Setup**

:LINK:REVerse:SETup:TABLe:CHANnel

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup:TABLe:CHANnel INIT|
APPend|<chan_num>,<chan_type>,<data_rate>,<power>,RANDom|<data_val>
[:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup:TABLe:
CHANnel? <chan_num>
```

This command defines the channel parameters for the CDMA2000 signal.

The channel number, configuration type, data rate, walsh code, power, pn offset, and data value are returned when a query is initiated. The output format is as follows:

<chan_type>,<data_rate>,<power>,<data_val>

The variable <data_rate> is expressed as bits per second (bps).

The variable <power> is expressed in units of decibels (dB).

INIT This choice clears the current information and creates a new one-row table, allowing for further definition using additional parameters.

APPend	This choice adds rows to an existing table. The maximum number of channels in a table is eight.
RANDom	This choice selects a randomly generated data value.
<data_val>	This variable customizes a specific data value.

***RST** *channel type*: PIL *<data_rate>*: +3.84000000E+004

<power>: -7.00000000E+000 *<pn_offset>*: +0 *<data_val>*: 0

Range *<data_rate>*: 1500–9600 *<power>*: –40 to 0

<data_val>: 0000000–11111111

Key Entry **Edit Channel Setup** **Insert Row** **Config** **Rate**

Walsh Code **PN Offset**

Remarks Queries initiated for this command must be followed by a specific channel number.

The above *RST value represents a query of channel one.

:LINK:REVerse:SETup:TABLe:NCHannels

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup:TABLe:NCHannels?
```

This command query returns the number of channels for the CDMA2000 link reverse setup.

***RST** +5

:LINK:REVerse:SETup:TABLe:PADJust

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup:TABLe:PADJust EQUal|
SCALe
```

This command customizes the code domain power (the relative power in each of the channels).

EQUal	This choice changes all channels to equal power, and the total power to 0 dB.
SCALe	This choice scales all of the current channel powers so that the total power equals 0 dB, keeping the previous power ratios between the individual channels.

Key Entry **Equal Powers** **Scale To 0dB**

:MDEStination:AAMPlitude

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:MDEStination:AAMPlitude NONE|M1|M2|M3|M4
[:SOURce]:RADio:CDMA2000:ARB:MDEStination:AAMPlitude?
```

This command routes the selected marker to the Alternate Amplitude function. The `NONE` parameter clears the marker for the Alternate Amplitude function.

***RST** NONE

Key Entry **None** **Marker 1** **Marker 2** **Marker 3** **Marker 4**

:MDEStination:ALCHold

Supported E4438C with Option 401

CAUTION Incorrect automatic level control (ALC) sampling can create a sudden unleveled condition that may create a spike in the RF output potentially damaging a DUT or connected instrument. Ensure that you set markers to let the ALC sample over an amplitude that accounts for the high power levels within the signal.

```
[:SOURce]:RADio:CDMA2000:ARB:MDEStination:ALCHold NONE|M1|M2|M3|M4
[:SOURce]:RADio:CDMA2000:ARB:MDEStination:ALCHold?
```

This command enables or disables the marker ALC hold function for the selected marker. For setting markers, see ":MARKer:[SET]" on page 306.

Use the ALC hold function when you have a waveform signal that incorporates idle periods, or when the increased dynamic range encountered with RF blanking is not desired. The ALC leveling circuitry responds to the marker signal during the marker pulse (marker signal high), averaging the modulated signal level during this period.

The ALC hold function operates during the low periods of the marker signal. The marker polarity determines when the marker signal is high. For a positive polarity, this is during the marker points. For a negative polarity, this is when there are no marker points. For setting a marker's polarity, see ":MPOLarity:MARKer1|2|3|4" on page 260.

NOTE Do not use the ALC hold for more than 100 ms, because it can affect the waveform's output amplitude.

The marker signal has a minimum of a two-sample delay in its response relative to the waveform signal response. To compensate for the marker signal delay, offset marker points from the waveform sample point at which you want the ALC sampling to begin.

The ALC hold setting is part of the file header information, so saving the setting to the file header saves the current marker routing for the waveform file.

NOTE A waveform file that has unspecified settings in the file header uses the previous waveform's routing settings.

For more information on the marker ALC hold function, see the *E4428C/38C ESG Signal Generators User's Guide*. For setting the marker points, see ":MARKer:[SET]" on page 306.

NONE This terminates the marker ALC hold function.

M1–M4 These are the marker choices. The ALC hold feature uses only one marker at a time.

***RST** NONE

Example

```
:RAD:AWGB:ARB:MDES:ALCH M1
```

The preceding example routes marker 1 to the ALC Hold function.

Key Entry	**None**	**Marker 1**	**Marker 2**	**Marker 3**	**Marker 4**

Remarks N/A

:MDEStination:PULSe

Supported E4438C with Option 401

CAUTION The pulse function incorporates ALC hold. Incorrect automatic level control (ALC) sampling can create a sudden unleveled condition that may create a spike in the RF output potentially damaging a DUT or connected instrument. Ensure that you set markers to let the ALC sample over an amplitude that accounts for the high power levels within the signal.

```
[:SOURce]:RADio:CDMA2000:ARB:MDEStination:PULSe NONE|M1|M2|M3|M4
[:SOURce]:RADio:CDMA2000:ARB:MDEStination:PULSe?
```

This command enables or disables the marker pulse/RF blanking function for the selected marker.

This function automatically uses the ALC hold function, so there is no need to select both the ALC hold and pulse/RF blanking functions for the same marker.

NOTE Do not use ALC hold for more than 100 ms, because it can affect the waveform's output amplitude.

The signal generator blanks the RF output when the marker signal goes low. The marker polarity determines when the marker signal is low. For a positive polarity, this is during the marker points. For a negative polarity, this is when there are no marker points. For setting a marker's polarity, see ":MPOLarity:MARKer1|2|3|4" on page 260.

NOTE Set marker points prior to using this function. Enabling this function without setting marker points may create a continuous low or high marker signal, depending on the marker polarity. This causes either no RF output or a continuous RF output. See ":MARKer:[SET]" on page 306 for setting the marker points.

The marker signal has a minimum of a two-sample delay in its response relative to the waveform signal response. To compensate for the marker signal delay, offset marker points from the waveform sample point at which you want the RF blanking to begin. The RF blanking setting is part of the file header information, so saving the setting to the file header saves the current marker routing for the waveform file.

NOTE A waveform file that has unspecified settings in the file header uses the previous waveform's routing settings. This could create the situation where there is no RF output signal, because the previous waveform used RF blanking.

For more information on the marker RF blanking function, see the *E4428C/38C ESG Signal Generators User's Guide*.

NONE This terminates the marker RF blanking/pulse function.

M1–M4 These are the marker choices. The RF blanking/pulse feature uses only one marker at a time.

Example

```
:RAD:ARB:MDES:PULS M2
```

The preceding example routes marker 2 to Pulse/RF Blanking.

***RST** NONE

Key Entry **None** **Marker 1** **Marker 2** **Marker 3** **Marker 4**

:MPOLarity:MARKer1|2|3|4

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:MPOLarity:MARKer1|2|3|4 NEGative|POSitive
[:SOURce]:RADio:CDMA2000:ARB:MPOLarity:MARKer1|2|3|4?
```

This command sets the polarity for the selected marker. For a positive marker polarity, the marker signal is high during the marker points. For a negative marker polarity, the marker signal is high during the period of no marker points.

***RST** POS

Key Entry **Marker 1 Polarity Neg Pos** **Marker 2 Polarity Neg Pos** **Marker 3 Polarity Neg Pos**

Marker 4 Polarity Neg Pos

:REFerence:EXTernal:FREQuency

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:REFerence:EXTernal:FREQuency <val>
[:SOURce]:RADio:CDMA2000:ARB:REFerence:EXTernal:FREQuency?
```

This command allows you to enter the frequency of the applied external reference.

The variable <val> is expressed in units of Hertz (KHz–MHz).

***RST** +1.00000000E+007

Range 2.5E5–1E8

Key Entry **Reference Freq**

Remarks The value specified by this command is effective only when you are using an external ARB reference applied to the BASEBAND GEN REF IN rear panel connector.

To specify external as the ARB reference source type, refer to ":REFerence[:SOURce]" on page 260.

:REFerence[:SOURce]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:REFerence[:SOURce] INTernal|EXTernal
[:SOURce]:RADio:CDMA2000:ARB:REFerence[:SOURce]?
```

This command selects either an internal or external reference for the waveform clock.

***RST**	INT
Key Entry	ARB Reference Ext Int
Remarks	If the EXTernal choice is selected, the external frequency value *must* be entered and the signal must be applied to the BASEBAND GEN REF IN rear panel connector. Refer to ":REFerence:EXTernal:FREQuency" on page 260 to enter the external reference frequency.

:RETRigger

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:RETRigger ON|OFF|IMMediate
[:SOURce]:RADio:CDMA:ARB:RETRigger?
```

This command enables or disables the ARB retriggering mode; the retrigger mode controls how the retriggering function performs while a waveform is playing.

ON (1)	This choice specifies that if a trigger occurs while a waveform is playing, the waveform will retrigger at the end of the current waveform sequence and play once more.
OFF (0)	This choice specifies that if a trigger occurs while a waveform is playing, the trigger will be ignored.
IMMediate	This choice specifies that if a trigger occurs while a waveform is playing, the waveform will reset and replay from the start immediately upon receiving a trigger.
***RST**	ON
Key Entry	**On** **Off** **Immediate**

:REVision

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:REVision?
```

This command queries the revision number of the current CDMA2000 format.

***RST** 8

:SCLock:RATE

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:SCLock:RATE <val>
[:SOURce]:RADio:CDMA2000:ARB:SCLock:RATE?
```

This command sets the sample clock rate for the CDMA2000 modulation format.

The variable <val> is expressed in units of hertz.

***RST** +1.00000000E+008

Range 1–1E8

Key Entry **ARB Sample Clock**

Remarks The modulation format should be active before executing this command. If this command is executed before the modulation format is active, the entered value will be overridden by a calculated factory default value. Refer to “[:STATe]” on page 269 to activate the modulation format.

:SPReading:RATE

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:SPReading:RATE 1|3
[:SOURce]:RADio:CDMA2000:ARB:SPReading:RATE?
```

This command opens a submenu that provides the available spread rate choices for the CDMA2000 waveform.

***RST** +1

Key Entry **Spread Rate 1** **Spread Rate 3**

Remarks The spread rate multiplied by 1.2288 MHz is equal to the chip rate. For example, spread rate 3 equals a 3.6864 Mcps chip rate.

Higher data rates can be achieved using spread rate 3, though offset by greater bandwidth/spectrum usage.

Changing the spread rate to either 1 or 3 will also change the initial setup menu, resulting in a configuration that is specific to the current spread rate.

:SPReading:TYPE

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:SPReading:TYPE DIRect|MCARrier
[:SOURce]:RADio:CDMA2000:ARB:SPReading:TYPE?
```

This command selects the spreading type for a CDMA2000 waveform.

***RST** DIR

Key Entry **Spreading Type Direct Mcarrier**

Remarks Multicarrier is not available in the reverse link setup.

Note that changing the spreading type will result in the setup changing to a setup for the current spreading type.

:SPReading:TYPE:MCARrier:SPACing

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:SPReading:TYPE:MCARrier:SPACing 1.23MHz|
1.25MHz
[:SOURce]:RADio:CDMA2000:ARB:SPReading:TYPE:MCARrier:SPACing?
```

This command selects the multicarrier frequency spacing.

***RST** +1.25000000E+006

Key Entry **1.23 MHz** **1.25 MHz**

Remarks Cellular band uses 1.23 MHz and PCS band uses 1.25 MHz.

:TRIGger:TYPE

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:TRIGger:TYPE CONTinuous|SINGle|GATE
[:SOURce]:RADio:CDMA2000:ARB:TRIGger:TYPE?
```

:TRIGger:TYPE

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA:ARB:TRIGger:TYPE CONTinuous|SINGle|GATE
[:SOURce]:RADio:CDMA:ARB:TRIGger:TYPE?
```

This command sets the trigger mode (type) that controls the waveform’s playback.

Triggers control the playback by telling the ESG when to play the modulating signal (waveform). Depending on the trigger settings for the ESG, the waveform playback can occur once, continuously, or the ESG may start and stop playing the waveform repeatedly (GATE mode).

A trigger signal comprises both positive and negative signal transitions (states), which are also called high and low periods. You can configure the ESG to trigger on either state of the trigger signal. It is common to have multiple triggers, also referred to as trigger occurrences or events, occur when the signal generator requires only a single trigger. In this situation, the ESG recognizes the first trigger and ignores the rest.

When you select a trigger mode, you may lose the signal (carrier plus modulating) from the RF output until you trigger the waveform. This is because the ESG sets the I and Q signals to zero volts prior to the first trigger event, which suppresses the carrier. After the first trigger event, the waveform's final I

and Q levels determine whether you will see the carrier signal or not (zero = no carrier, other values = carrier visible). At the end of most files, the final I and Q points are set to a value other than zero.

There are four parts to configuring the trigger:

- Choosing the trigger type, which controls the waveform's transmission.
- Setting the waveform's response to triggers:
  - CONTinuous, see ":TRIGger:TYPE:CONTinuous[:TYPE]" on page 265
  - SINGle, see ":RETRigger" on page 261
  - GATE, selecting the mode also sets the response
- Selecting the trigger source (see ":TRIGger[:SOURce]" on page 266), which determines how the ESG receives its trigger signal, internally or externally. The GATE choice requires an external trigger.
- Setting the trigger polarity when using an external source:
  - CONTinuous and SINGle see ":TRIGger[:SOURce]:EXTernal:SLOPe" on page 268
  - GATE, see ":TRIGger:TYPE:GATE:ACTive" on page 266

For more information on triggering, see the *E4428C/38C ESG Signal Generators User's Guide*.

The following list describes the trigger type command choices:

CONTinuous	Upon triggering, the waveform repeats continuously.
SINGle	Upon triggering, the waveform segment or sequence plays once.

GATE	An external trigger signal repeatedly starts and stops the waveform's playback (transmission). The time duration for playback depends on the duty period of the trigger signal and the gate polarity selection (see ":TRIGger:TYPE:GATE:ACTive" on page 266). The waveform plays during the inactive state and stops during the active polarity selection state. The active state can be set high or low. The gate mode works only with an external trigger source.

NOTE The ARB gating behavior described above is opposite to the gating behavior for real-time custom mode.

***RST** CONT

Key Entry **Continuous** **Single** **Gated**

:TRIGger:TYPE:CONTinuous[:TYPE]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:TRIGger:TYPE:CONTinuous[:TYPE] FREE|
TRIGger|RESet
[:SOURce]:RADio:CDMA2000:ARB:TRIGger:TYPE:CONTinuous[:TYPE]?
```

This commands selects the waveform's response to a trigger signal while using the continuous trigger mode.

For more information on triggering and to select the continuous trigger mode, see ":TRIGger:TYPE" on page 263.

The following list describes the waveform's response to each of the command choices:

FREE	Turning the ARB format on immediately triggers the waveform. The waveform repeats until you turn the format off, select another trigger, or choose another waveform file.
TRIGger	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously until you turn the format off, select another trigger, or choose another waveform file.
RESet	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously. Subsequent triggers reset the waveform to the beginning. For a waveform sequence, this means to the beginning of the first segment in the sequence.

***RST** FREE

Key Entry **Free Run** **Trigger & Run** **Reset & Run**

:TRIGger:TYPE:GATE:ACTive

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:TRIGger:TYPE:GATE:ACTive LOW|HIGH
[:SOURce]:RADio:CDMA2000:ARB:TRIGger:TYPE:GATE:ACTive?
```

This command selects the active state (gate polarity) of the gate while using the gating trigger mode.

The LOW and HIGH selections correspond to the low and high states of an external trigger signal. For example, when you select HIGH, the active state occurs during the high of the trigger signal. When the active state occurs, the ESG stops the waveform playback at the last played sample point, then restarts the playback at the next sample point when the inactive state occurs. For more information on triggering and to select gating as the trigger mode, see ":TRIGger:TYPE" on page 263.

The following list describes the ESG's gating behavior for the polarity selections:

LOW The waveform playback stops when the trigger signal goes low (active state) and restarts when the trigger signal goes high (inactive state).

HIGH The waveform playback stops when the trigger signal goes high (active state) and restarts when the trigger signal goes low (inactive state).

***RST** HIGH

Key Entry **Gate Active Low High**

:TRIGger[:SOURce]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce] KEY|EXT|BUS
[:SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]?
```

This command sets the trigger source.

For more information on triggering, see ":TRIGger:TYPE" on page 263. The following list describes the command choices:

KEY This choice enables manual triggering by pressing the front-panel **Trigger** hardkey.

EXT An externally applied signal triggers the waveform. This is the only choice that works with gating. The following conditions affect an external trigger:

- The input connector selected for the trigger signal. You have a choice between the rear-panel PATTERN TRIG IN connector or the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector. To make the connector selection, see ":TRIGger[:SOURce]:EXTernal[:SOURce]" on page 269.

For more information on the connectors and on connecting the cables, see the *E4428C/38C ESG Signal Generators User's Guide*.

- The trigger signal polarity:
  - — gating mode, see ":TRIGger:TYPE:GATE:ACTive" on page 266
  - — continuous and single modes, see ":TRIGger[:SOURce]:EXTernal:SLOPe" on page 268
- The time delay between when the ESG receives a trigger and when the waveform responds to the trigger. There are two parts to setting the delay:
  - — setting the amount of delay, see ":TRIGger[:SOURce]:EXTernal:DELay" on page 267
  - — turning the delay on, see ":TRIGger[:SOURce]:EXTernal:DELay:STATe" on page 268

BUS — This choice enables triggering over the GPIB or LAN using the `*TRG` or `GET` commands or the AUXILIARY INTERFACE (RS-232) using the `*TRG` command.

***RST** EXT

Key Entry **Trigger Key** **Ext** **Bus**

:TRIGger[:SOURce]:EXTernal:DELay

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]:EXTernal:DELay <val>
[:SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]:EXTernal:DELay?
```

This command sets the amount of time to delay the ESG's response to an external trigger.

The delay is a path (time) delay between when the ESG receives the trigger and when it responds to the trigger. For example, configuring a trigger delay of two seconds, causes the ESG to wait two seconds after receipt of the trigger before the ESG plays the waveform.

The delay does not occur until you turn it on (see ":TRIGger[:SOURce]:EXTernal:DELay:STATe" on page 268). You can set the delay value either before or after turning it on.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 266.

The unit of measurement for the variable <val> is in seconds (nsec–sec).

***RST** +1.00000000E–003

Range 1E–8 to 4E1

Key Entry **Ext Delay Time**

:TRIGger[:SOURce]:EXTernal:DELay:STATe

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]:EXTernal:DELay:STATe ON|
OFF|1|0
[:SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]:EXTernal:DELay:STATe?
```

This command enables or disables the operating state of the external trigger delay function.

For setting the delay time, see ":TRIGger[:SOURce]:EXTernal:DELay" on page 267, and for more information on configuring an external source, see":TRIGger[:SOURce]" on page 266.

***RST** 0

Key Entry Ext Delay Off On

:TRIGger[:SOURce]:EXTernal:SLOPe

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]:EXTernal:SLOPe POSitive|
NEGative
[:SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]:EXTernal:SLOPe?
```

This command sets the polarity for an external trigger signal while using the continuous, single triggering mode. To set the polarity for gating, see ":TRIGger:TYPE:GATE:ACTive" on page 266.

The POSitive and NEGative selections correspond to the high (positive) and low (negative) states of the external trigger signal. For example, when you select POSitive, the waveform responds (plays) during the high state of the trigger signal. When the ESG receives multiple trigger occurrences when only one is required, the signal generator uses the first trigger and ignores the rest.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 266.

***RST** NEG

Key Entry **Ext Polarity Neg Pos**

:TRIGger[:SOURce]:EXTernal[:SOURce]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]:EXTernal[:SOURce] EPT1|
EPT2|EPTRIGGER1|EPTRIGGER2
[:SOURce]:RADio:CDMA2000:ARB:TRIGger[:SOURce]:EXTernal[:SOURce]?
```

This command selects which PATTERN TRIG IN connection the ESG uses to accept an externally applied trigger signal when external is the trigger source selection.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 266. For more information on the rear-panel connectors, see the *E4428C/38C ESG Signal Generators User's Guide*.

The following list describes the command choices:

EPT1 — This choice is synonymous with EPTRIGGER1 and selects the PATTERN TRIG IN rear-panel connector.

EPT2 — This choice is synonymous with EPTRIGGER2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.

EPTRIGGER1 — This choice is synonymous with EPT1 and selects the PATTERN TRIG IN rear-panel connector.

EPTRIGGER2 — This choice is synonymous with EPT2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.

***RST** EPT1

Key Entry **Patt Trig In 1** **Patt Trig In 2**

[:STATe]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000:ARB[:STATe] ON|OFF|1|0
[:SOURce]:RADio:CDMA2000:ARB[:STATe]?
```

This command enables or disables the CDMA2000 modulation format.

ON (1) — This choice enables the CDMA2000 modulation capability and sets up the internal hardware to generate the currently selected CDMA2000 signal selection.

This choice also activates the I/Q state and sets the I/Q source to internal.

OFF (0) — This choice disables the CDMA2000 baseband signal capability.

***RST** 0

Key Entry **CDMA2000 Off On**

Dmodulation Subsystem–Option 001/601 or 002/602 ([:SOURce]:RADio:DMODulation:ARB)

:IQ:EXTernal:FILTer

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:IQ:EXTernal:FILTer 40e6|THRough
[:SOURce]:RADio:DMODulation:ARB:IQ:EXTernal:FILTer?
```

This command selects the filter or through path for I/Q signals routed to the rear panel I and Q outputs. Selecting a filter using this command will automatically set ":IQ:EXTernal:FILTer:AUTO" on page 270 to OFF(0) mode.

40e6	This choice applies a 40 MHz baseband filter.
THRough	This choice bypasses filtering.
***RST**	THR
Key Entry	**40.000 MHz** **Through**

:IQ:EXTernal:FILTer:AUTO

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:IQ:EXTernal:FILTer:AUTO ON|OFF|1|0
[:SOURce]:RADio:DMODulation:ARB:IQ:EXTernal:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals routed to the rear panel I/Q outputs.

ON(1)	This choice will automatically select a digital modulation filter optimized for the current signal generator settings.
OFF(0)	This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to ":IQ:EXTernal:FILTer" on page 270 for selecting a filter or through path.
***RST**	1
Key Entry	**I/Q Output Filter Manual Auto**

:FILTer

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:FILTer RNYQuist|NYQuist|GAUSsian|
RECTangle|IS95|IS95_EQ|IS95_MOD|IS95_MOD_EQ|WCDMa|AC4Fm|IS2000SR3DS|
UGGaussian|"<user FIR>"
[:SOURce]:RADio:DMODulation:ARB:FILTer?
```

This command specifies the pre-modulation filter type.

IS95 This choice selects a filter that meets the criteria of the IS-95 standard.

IS95_EQ This choice selects a filter which is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard. This filter is only used for IS-95 baseband filtering.

IS95_MOD This choice selects a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.

IS95_MOD_EQ This choice selects a filter which is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance), with lower passband rejection.

WCDMa This choice selects a 0.22 Nyquist filter optimized for ACP.

AC4Fm This choice selects a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.

IS2000SR3DS This choice selects an IS-2000 standard, spread rate 3 direct spread filter.

UGGaussian This choice selects a backwards compatible GSM Gaussian filter (Gaussian filter with a fixed BbT value of 0.300) for the ESG E44xxB Option UN3 or UN4.

`"<user FIR>"` This variable is any FIR filter file that you have stored in memory. The variable needs no directory path indicating the location of the file, such as `FIR:` or `/USER/FIR`. The command assumes the FIR directory. Refer to “File Name Variables” on page 13 for more information on file names.

***RST** `RNYQ`

Key Entry **Root Nyquist** **Nyquist** **Gaussian** **Rectangle** **IS-95** **IS-95 w/EQ**

IS-95 Mod **IS-95 Mod w/EQ** **WCDMA** **IS-2000 SR3 DS** **APCO 25 C4FM**

UN3/4 GSM Gaussian **User FIR**

:FILTer:ALPHa

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:FILTer:ALPHa <val>
[:SOURce]:RADio:DMODulation:ARB:FILTer:ALPHa?
```

This command changes the Nyquist or root Nyquist filter alpha value.

The filter alpha value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +3.50000000E–001

Range 0.000–1.000

Key Entry **Filter Alpha**

Remarks To change the current filter type, refer to “:FILTer” on page 271.

:FILTer:BBT

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:FILTer:BBT <val>
[:SOURce]:RADio:DMODulation:ARB:FILTer:BBT?
```

This command changes the bandwidth-multiplied-by-bit-time (BbT) filter parameter.

The filter BbT value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +5.00000000E–001

Range 0.000–1.000

Key Entry **Filter BbT**

Remarks This command is effective only after choosing a Gaussian filter. It does not have an effect on other types of filters.

To change the current filter type, refer to “:FILTer” on page 271.

:FILTer:CHANnel

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:FILTer:CHANnel EVM|ACP
[:SOURce]:RADio:DMODulation:ARB:FILTer:CHANnel?
```

This command optimizes the Nyquist and root Nyquist filters to minimize error vector magnitude (EVM) or to minimize adjacent channel power (ACP).

EVM This choice provides the most ideal passband.

ACP This choice improves stopband rejection.

***RST** EVM

Key Entry **Optimize FIR For EVM ACP**

Remarks To change the current filter type, refer to ":FILTer" on page 271.

:HEADer:CLEar

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:HEADer:CLEar
```

This command clears the header information from the file header used by this modulation format.

Key Entry **Clear Header**

Remarks The **Digital Modulation Off On** softkey must be set to On for this command to function.

:HEADer:SAVE

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:HEADer:SAVE
```

This command saves the header information to the file header used by this modulation format.

Key Entry **Save Setup To Header**

Remarks The **Digital Modulation Off On** softkey must be set to On for this command to function.

:IQ:MODulation:ATTen

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:IQ:MODulation:ATTen <val>
[:SOURce]:RADio:DMODulation:ARB:IQ:MODulation:ATTen?
```

This command sets the attenuation level of the I/Q signals being modulated through the signal generator RF path.

The variable <val> is expressed in units of decibels (dB).

***RST** +2.00000000E+000

Range 0–40

Key Entry **Modulator Atten Manual Auto**

:IQ:MODulation:ATTen:AUTO

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:IQ:MODulation:ATTen:AUTO ON|OFF|1|0
[:SOURce]:RADio:DMODulation:ARB:IQ:MODulation:ATTen:AUTO?
```

This command enables or disables the I/Q attenuation auto mode.

ON (1) This choice enables the attenuation auto mode which optimizes the modulator attenuation for the current conditions.

OFF (0) This choice holds the attenuator at its current setting or at a selected value. Refer to ":IQ:MODulation:ATTen" on page 207 for setting the attenuation value.

***RST** 1

Key Entry **Modulator Atten Manual Auto**

:IQ:MODulation:FILTer

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:IQ:MODulation:FILTer 2.1e6|40e6|THRough
[:SOURce]:RADio:DMODulation:ARB:IQ:MODulation:FILTer?
```

This command enables you to select a filter or through path for I/Q signals modulated onto the RF carrier. Selecting a filter using this command will automatically set ":IQ:MODulation:FILTer:AUTO" on page 275 to OFF(0) mode.

2.1E6 This choice applies a 2.1 MHz baseband filter to the I/Q signals.

40E6 This choice applies a 40 MHz baseband filter to the I/Q signals.

THRough This choice bypasses filtering.

***RST** THR

Key Entry **2.100 MHz** **40.000 MHz** **Through**

:IQ:MODulation:FILTer:AUTO

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:IQ:MODulation:FILTer:AUTO ON|OFF|1|0
[:SOURce]:RADio:DMODulation:ARB:IQ:MODulation:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals modulated onto the RF carrier.

ON(1) This choice will automatically select a digital modulation filter.

OFF(0) This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to ":IQ:MODulation:FILTer" on page 275 for selecting a filter or through path.

***RST** 1

Key Entry **I/Q Mod Filter Manual Auto**

:MDEStination:AAMPlitude

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:MDEStination:AAMPlitude NONE|M1|M2|M3|M4
[:SOURce]:RADio:DMODulation:ARB:MDEStination:AAMPlitude?
```

This command routes the selected marker to the Alternate Amplitude function. The `NONE` parameter clears the marker for the Alternate Amplitude function.

***RST** NONE

Key Entry **None** **Marker 1** **Marker 2** **Marker 3** **Marker 4**

:MDEStination:ALCHold

Supported E4438C with Option 403

CAUTION Incorrect automatic level control (ALC) sampling can create a sudden unleveled condition that may create a spike in the RF output potentially damaging a DUT or connected instrument. Ensure that you set markers to let the ALC sample over an amplitude that accounts for the high power levels within the signal.

```
[:SOURce]:RADio:DMODulation:ARB:MDEStination:ALCHold NONE|M1|M2|M3|M4
[:SOURce]:RADio:DMODulation:ARB:MDEStination:ALCHold?
```

This command enables or disables the marker ALC hold function for the selected marker. For setting markers, see ":MARKer:[SET]" on page 306.

Use the ALC hold function when you have a waveform signal that incorporates idle periods, or when the increased dynamic range encountered with RF blanking is not desired. The ALC leveling circuitry responds to the marker signal during the marker pulse (marker signal high), averaging the modulated signal level during this period.

The ALC hold function operates during the low periods of the marker signal. The marker polarity determines when the marker signal is high. For a positive polarity, this is during the marker points. For a negative polarity, this is when there are no marker points. For setting a marker's polarity, see ":MPOLarity:MARKer1|2|3|4" on page 280.

NOTE Do not use the ALC hold for more than 100 ms, because it can affect the waveform's output amplitude.

The marker signal has a minimum of a two-sample delay in its response relative to the waveform signal response. To compensate for the marker signal delay, offset marker points from the waveform sample point at which you want the ALC sampling to begin.

The ALC hold setting is part of the file header information, so saving the setting to the file header saves the current marker routing for the waveform file.

NOTE A waveform file that has unspecified settings in the file header uses the previous waveform's routing settings.

For more information on the marker ALC hold function, see the *E4428C/38C ESG Signal Generators User's Guide*. For setting the marker points, see ":MARKer:[SET]" on page 306.

NONE This terminates the marker ALC hold function.

M1–M4 These are the marker choices. The ALC hold feature uses only one marker at a time.

***RST** NONE

Example

```
:RAD:AWGB:ARB:MDES:ALCH M1
```

The preceding example routes marker 1 to the ALC Hold function.

Key Entry **None** **Marker 1** **Marker 2** **Marker 3** **Marker 4**

Remarks N/A

:MDEStination:PULSe

Supported E4438C with Option 001/601or 002/602

CAUTION The pulse function incorporates ALC hold. Incorrect automatic level control (ALC) sampling can create a sudden unleveled condition that may create a spike in the RF output potentially damaging a DUT or connected instrument. Ensure that you set markers to let the ALC sample over an amplitude that accounts for the high power levels within the signal.

```
[:SOURce]:RADio:DMODulation:ARB:MDEStination:PULSe NONE|M1|M2|M3|M4
[:SOURce]:RADio:DMODulation:ARB:MDEStination:PULSe?
```

This command enables or disables the marker pulse/RF blanking function for the selected marker.

This function automatically uses the ALC hold function, so there is no need to select both the ALC hold and pulse/RF blanking functions for the same marker.

NOTE	Do not use ALC hold for more than 100 ms, because it can affect the waveform's output amplitude.

The signal generator blanks the RF output when the marker signal goes low. The marker polarity determines when the marker signal is low. For a positive polarity, this is during the marker points. For a negative polarity, this is when there are no marker points. For setting a marker's polarity, see ":MPOLarity:MARKer1|2|3|4" on page 280.

NOTE	Set marker points prior to using this function. Enabling this function without setting marker points may create a continuous low or high marker signal, depending on the marker polarity. This causes either no RF output or a continuous RF output. See ":MARKer:[SET]" on page 306 for setting the marker points.

The marker signal has a minimum of a two-sample delay in its response relative to the waveform signal response. To compensate for the marker signal delay, offset marker points from the waveform sample point at which you want the RF blanking to begin. The RF blanking setting is part of the file header information, so saving the setting to the file header saves the current marker routing for the waveform file.

NOTE	A waveform file that has unspecified settings in the file header uses the previous waveform's routing settings. This could create the situation where there is no RF output signal, because the previous waveform used RF blanking.

For more information on the marker RF blanking function, see the *E4428C/38C ESG Signal Generators User's Guide*.

NONE	This terminates the marker RF blanking/pulse function.
M1–M4	These are the marker choices. The RF blanking/pulse feature uses only one marker at a time.

Example

```
:RAD:ARB:MDES:PULS M2
```

The preceding example routes marker 2 to Pulse/RF Blanking.

***RST** NONE

Key Entry **None** **Marker 1** **Marker 2** **Marker 3** **Marker 4**

:MODulation:FSK[:DEViation]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:MODulation:FSK[:DEViation] <val>
[:SOURce]:RADio:DMODulation:ARB:MODulation:FSK[:DEViation]?
```

This command sets the symmetric FSK frequency deviation value.

The variable <val> is expressed in units of Hertz and the maximum range value equals the current symbol rate value multiplied by ten, limited to 20 MHz.

***RST** +4.00000000E+002

Range 0–2E7

Key Entry **Freq Dev**

Remarks To change the modulation type, refer to ":MODulation[:TYPE]" on page 279.

Refer to ":SRATe" on page 286 for a list of the minimum and maximum symbol rate values.

To set an asymmetric FSK deviation value, refer to the *E4428C/38C ESG Signal Generators User's Guide* for more information.

:MODulation[:TYPE]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio[1]|2|3|4:DMODulation:ARB:MODulation[:TYPE] ASK|BPSK|QPSK
|UQPSk|IS95QPSK|GRAYQPSK|OQPSK|IS95OQPSK|P4DQPSK|PSK8|PSK16|D8PSK|EDGE|M
SK|FSK2|FSK4|FSK8|FSK16|C4FM|HCPM|HDQPSK|QAM4|QAM16|QAM32|QAM64|QAM128|Q
AM256|UIQ|UFSK
```

```
[:SOURce]:RADio:DMODulation:ARB:MODulation[:TYPE]?
```

This command sets the modulation type for the digital modulation personality.

***RST** P4DQPSK

Key Entry **ASK** **BPSK** **QPSK** **UQPSk** **IS95QPSK** **GREYQPSK** **OQPSK** **IS95OQPSK** **P4DQPSK** **PSK8** **PSK16** **D8PSK** **EDGE** **MSK** **FSK2** **FSK4** **FSK8** **FSK16** **C4FM** **HCPM** **HDQPSK** **QAM4** **QAM16** **QAM32** **QAM64** **QAM128** **QAM256** **UIQ** **UFSK**

:MPOLarity:MARKer1|2|3|4

Supported E4438C with Option 401

```
[:SOURce]:RADio:DMODulation:ARB:MPOLarity:MARKer1|2|3|4 NEGative|
POSitive
[:SOURce]:RADio:DMODulation:ARB:MPOLarity:MARKer1|2|3|4?
```

This command sets the polarity for the selected marker. For a positive marker polarity, the marker signal is high during the marker points. For a negative marker polarity, the marker signal is high during the period of no marker points.

***RST** POS

Key Entry **Marker 1 Polarity Neg Pos** **Marker 2 Polarity Neg Pos** **Marker 3 Polarity Neg Pos**

Marker 4 Polarity Neg Pos

:REFerence:EXTernal:FREQuency

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:REFerence:EXTernal:FREQuency <val>
[:SOURce]:RADio:DMODulation:ARB:REFerence:EXTernal:FREQuency?
```

This command conveys the expected reference frequency value of an externally applied reference the signal generator.

The variable <val> is expressed in units of Hertz (Hz–MHz).

***RST** +1.00000000E+007

Range 2.5E5–1E8

Key Entry **Reference Freq**

Remarks The value specified by this command is effective only when you are using an external ARB reference applied to the BASEBAND GEN REF IN rear panel connector.

To specify external as the ARB reference source type, refer to ":REFerence[:SOURce]" on page 281.

:REFerence[:SOURce]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:REFerence[:SOURce] INTernal|EXTernal
[:SOURce]:RADio:DMODulation:ARB:REFerence[:SOURce]?
```

This command selects either an internal or external reference for the waveform clock.

***RST** INT

Key Entry **ARB Reference Ext Int**

Remarks If the EXTernal choice is selected, the external frequency value *must* be entered and the signal must be applied to the BASEBAND GEN REF IN rear panel connector.

Refer to ":REFerence:EXTernal:FREQuency" on page 280 to enter the external reference frequency.

:RETRigger

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:RETRigger ON|OFF|IMMediate
[:SOURce]:RADio:DMODulation:ARB:RETRigger?
```

This command enables or disables the ARB retriggering mode; the retrigger mode controls how the retriggering function performs while a waveform is playing.

ON (1) This choice specifies that if a trigger occurs while a waveform is playing, the waveform will retrigger at the end of the current waveform sequence and play once more.

OFF (0) This choice specifies that if a trigger occurs while a waveform is playing, the trigger will be ignored.

IMMediate This choice specifies that if a trigger occurs while a waveform is playing, the waveform will reset and replay from the start immediately upon receiving a trigger.

***RST** ON

Key Entry **On** **Off** **Immediate**

:SCLock:RATE

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:SCLock:RATE <val>
[:SOURce]:RADio:DMODulation:ARB:SCLock:RATE?
```

This command sets the sample clock rate.

The variable <val> is expressed in units of Hertz (Hz – MHz)

***RST** +1.00000000E+008

Range 1–1E8

Key Entry **ARB Sample Clock**

Remarks The modulation format should be active before executing this command. If this command is executed before the modulation format is active, the entered value will be overridden by a calculated factory default value. Refer to “[:STATe]” on page 293 to activate the modulation format.

:SETup

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:SETup GSM|NADC|PDC|PHS|DECT|AC4Fm|ACQPsk
|AHCPm|AHDQpsk|CDPD|PWT|EDGE|TETRa|MCARrier|"file name"
[:SOURce]:RADio:DMODulation:ARB:SETup?
```

This command selects the digital modulation format type or multicarrier, and turns multicarrier off or on (see the MCARrier choice description).

The *MCARrier* choice selects multicarrier and turns it on. Selecting any other setup such as GSM or CDPD turns multicarrrier off. To select the multicarrier setup, see “:SETup:MCARrier” .

***RST** NADC

Key Entry **GSM** **NADC** **PDC** **PHS** **DECT** **AC4Fm** **ACQPsk** **AHCPm** **AHDQpsk** **CDPD** **PWT** **EDGE** **TETRa** **MCARrier** **"file name"**

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:SETup:MCARrier

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:SETup:MCARrier GSM|NADC|PDC|PHS|DECT|
AC4Fm|ACQPsk|CDPD|PWT|EDGE|TETRa,<num carriers>,<freq spacing>)|
"<file name>"
[:SOURce]:RADio:DMODulation:ARB:SETup:MCARrier?
```

This command builds a table with the specified number of carriers and frequency spacing or retrieves the setup stored in the specified user file.

The carrier type, number of carriers, and frequency spacing value are returned when a query is initiated. The output format is as follows:

```
<carrier type>,<num carriers>,<freq spacing>
```

If a specific file is loaded and then queried, only the file name is returned.

The variable <freq spacing> is expressed in units of Hertz (kHz–MHz).

***RST** *Carrier*: NADC <*num carriers*>: 2

<*freq spacing*>: +1.0000000000000E+06

Range <*num carriers*>: 2–100

<*freq spacing*>: 2 ÷ (<num carriers> – 1) × 80 MHz

Key Entry **GSM** **NADC** **PDC** **PHS** **DECT** **APCO 25 w/C4FM** **APCO w/CQPSK** **CDPD** **PWT** **EDGE** **TETRA** **# of Carriers** **Freq Spacing** **Custom Digital Mod State**

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

To store a multicarrier setup refer to “:SETup:MCARrier:STORe” on page 284.

:SETup:MCARrier:PHASe

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:SETup:MCARrier:PHASe FIXed|RANDom
[:SOURce]:RADio:DMODulation:ARB:SETup:MCARrier:PHASe?
```

This command toggles the phase settings for multicarrier digital modulation.

FIXed This choice sets the phase of all carriers to 0.

RANDom This choice sets random phase values for all of the carriers.

***RST** FIX

Key Entry **Carrier Phases Fixed Random**

:SETup:MCARrier:STORe

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:SETup:MCARrier:STORe "<file name>"
```

This command stores the current multicarrier setup information.

The stored file contains information that includes the digital modulation format, number of carriers, frequency spacing, and power settings for the multicarrier setup.

Key Entry **Load/Store**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

Refer to "File Name Variables" on page 13 for information on the file name syntax.

:SETup:MCARrier:TABLe

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:SETup:MCARrier:TABLe INIT|APPend|
<carrier_num>,GSM|NADC|PDC|PHS|DECT|AC4Fm|ACQPsk|CDPD|PWT|EDGE|TETRa|
"<file name>",<freq_offset>,<power>
[:SOURce]:RADio:DMODulation:ARB:SETup:MCARrier:TABLe? <carrier_num>
```

This command modifies the parameters of one of the available multicarrier digital modulation formats.

The variable <freq_offset> is expressed in units of Hertz (kHz–MHz).

The variable <power> is expressed in units of decibels (dB).

INIT This choice clears the current information and creates a new one-row table, allowing for further definition using additional parameters.

APPend This choice adds rows to an existing table.

<carrier_num> This variable specifies the number of the carriers in the multicarrier table that will be modified.

The value of the variable <carrier_num> must be specified prior to selecting the digital modulation format.

Carrier type, frequency offset, and power level are returned when a query is initiated. The output format is as follows:

```
<carrier type>,<freq_offset>,<power>
```

***RST** *carrier type*: NADC <*freq_offset*>: -5.00000000E+004

<*power*>: +0.00000000E+000

Range <*freq_offset*>: –1E5 to 1E6 <*power*>: –40 to 0

Key Entry **Initialize Table** **Insert Row** **GSM** **NADC** **PDC** **PHS** **DECT**

APCO 25 w/C4FM **APCO w/CQPSK** **CDPD** **PWT** **EDGE** **TETRA**

Custom Digital Mod State

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

To store a multicarrier setup refer to “:SETup:MCARrier:STORe” on page 284.

:SETup:MCARrier:TABLe:NCARriers

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:SETup:MCARrier:TABLe:NCARriers?
```

This query returns the number of carriers in the current multicarrier setup.

***RST** +2

Range 1–100

Key Entry **# of Carriers**

:SETup:STORe

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:SETup:STORe "<file name>"
```

This command stores the current custom digital modulation state.

The saved file contains information that includes the modulation type, filter and symbol rate for the custom modulation setup.

Key Entry **Store Custom Dig Mod State**

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:SRATe

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:SRATe <val>
[:SOURce]:RADio:DMODulation:ARB:SRATe?
```

This command sets the transmission symbol rate.

The variable `<val>` is expressed in units of symbols per second (sps–Msps) and the maximum range value is dependent upon the modulation type, and filter.

***RST** +2.43000000E+004

Range

Modulation Type	*Bits per Symbol*	*Internal Data*
BPSK	1	1sps–50 Msps
FSK2		
MSK		
C4FM	2	1sps–50 Msps
FSK4		
OQPSK		
OQPSK195		
P4QPPSK		
QAM4		
QPSK		
QPSKIS95		
QPSKISAT		
D8PSK	3	1sps–33.33 Msps
EDGE		
FSK8		
PSK8		
FSK16	4	1sps–25 Msps
PSK16		
QAM16		
QAM32	5	1sps–20 Msps
QAM64	6	1sps–16.67 Msps
QAM256	8	1sps–12.50 Msps

Key Entry **Symbol Rate**

Remarks When user-defined filters are selected using the command in section ":FILTer" on page 271, the upper bit rate will be restricted in line with the following symbol rate restriction:

- FIR filter length > 32 symbols: upper limit is 12.5 Msps

- FIR filter length > 16 symbols: upper limit is 25 Msps

When internal FIR filters are used, the limits of the above table always apply. For higher symbol rates, the FIR filter length will be truncated as follows:

- Above 12.5 Msps, the FIR length will be truncated to 32 symbols
- Above 25 Msps, the FIR length will be truncated to 16 symbols

  This will impact the relative timing of the modulated data, as well as the actual filter response.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 279.

:TRIGger:TYPE

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:TRIGger:TYPE CONTinuous|SINGle|GATE
[:SOURce]:RADio:DMODulation:ARB:TRIGger:TYPE?
```

This command sets the trigger mode (type) that controls the waveform's playback.

Triggers control the playback by telling the ESG when to play the modulating signal (waveform). Depending on the trigger settings for the ESG, the waveform playback can occur once, continuously, or the ESG may start and stop playing the waveform repeatedly (GATE mode).

A trigger signal comprises both positive and negative signal transitions (states), which are also called high and low periods. You can configure the ESG to trigger on either state of the trigger signal. It is common to have multiple triggers, also referred to as trigger occurrences or events, occur when the signal generator requires only a single trigger. In this situation, the ESG recognizes the first trigger and ignores the rest.

When you select a trigger mode, you may lose the signal (carrier plus modulating) from the RF output until you trigger the waveform. This is because the ESG sets the I and Q signals to zero volts prior to the first trigger event, which suppresses the carrier. After the first trigger event, the waveform's final I and Q levels determine whether you will see the carrier signal or not (zero = no carrier, other values = carrier visible). At the end of most files, the final I and Q points are set to a value other than zero.

There are four parts to configuring the trigger:

- Choosing the trigger type, which controls the waveform's transmission.
- Setting the waveform's response to triggers:

  — CONTinuous, see ":TRIGger:TYPE:CONTinuous[:TYPE]" on page 288
  — SINGle, see ":RETRigger" on page 281
  — GATE, selecting the mode also sets the response

- Selecting the trigger source (see ":TRIGger[:SOURce]" on page 290), which determines how the ESG receives its trigger signal, internally or externally. The GATE choice requires an external trigger.
- Setting the trigger polarity when using an external source:

  — CONTinuous and SINGle see ":TRIGger[:SOURce]:EXTernal:SLOPe" on page 292
  — GATE, see ":TRIGger:TYPE:GATE:ACTive" on page 289

For more information on triggering, see the *E4428C/38C ESG Signal Generators User's Guide*.

The following list describes the trigger type command choices:

CONTinuous	Upon triggering, the waveform repeats continuously.
SINGle	Upon triggering, the waveform segment or sequence plays once.
GATE	An external trigger signal repeatedly starts and stops the waveform's playback (transmission). The time duration for playback depends on the duty period of the trigger signal and the gate polarity selection (see ":TRIGger:TYPE:GATE:ACTive" on page 289). The waveform plays during the inactive state and stops during the active polarity selection state. The active state can be set high or low. The gate mode works only with an external trigger source.

NOTE The ARB gating behavior described above is opposite to the gating behavior for real-time custom mode.

***RST** CONT

Key Entry **Continuous** **Single** **Gated**

:TRIGger:TYPE:CONTinuous[:TYPE]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:TRIGger:TYPE:CONTinuous[:TYPE] FREE|
TRIGger|RESet
[:SOURce]:RADio:DMODulation:ARB:TRIGger:TYPE:CONTinuous[:TYPE]?
```

This commands selects the waveform's response to a trigger signal while using the continuous trigger mode.

For more information on triggering and to select the continuous trigger mode, see ":TRIGger:TYPE" on page 287.

The following list describes the waveform's response to each of the command choices:

FREE	Turning the ARB format on immediately triggers the waveform. The waveform repeats until you turn the format off, select another trigger, or choose another waveform file.
TRIGger	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously until you turn the format off, select another trigger, or choose another waveform file.
RESet	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously. Subsequent triggers reset the waveform to the beginning. For a waveform sequence, this means to the beginning of the first segment in the sequence.
***RST**	FREE
Key Entry	**Free Run** **Trigger & Run** **Reset & Run**

:TRIGger:TYPE:GATE:ACTive

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:TRIGger:TYPE:GATE:ACTive LOW|HIGH
[:SOURce]:RADio:DMODulation:ARB:TRIGger:TYPE:GATE:ACTive?
```

This command selects the active state (gate polarity) of the gate while using the gating trigger mode.

The LOW and HIGH selections correspond to the low and high states of an external trigger signal. For example, when you select HIGH, the active state occurs during the high of the trigger signal. When the active state occurs, the ESG stops the waveform playback at the last played sample point, then restarts the playback at the next sample point when the inactive state occurs. For more information on triggering and to select gating as the trigger mode, see ":TRIGger:TYPE" on page 287.

The following list describes the ESG's gating behavior for the polarity selections:

LOW	The waveform playback stops when the trigger signal goes low (active state) and restarts when the trigger signal goes high (inactive state).
HIGH	The waveform playback stops when the trigger signal goes high (active state) and restarts when the trigger signal goes low (inactive state).
***RST**	HIGH
Key Entry	**Gate Active Low High**

:TRIGger[:SOURce]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:TRIGger[:SOURce] KEY|EXT|BUS
[:SOURce]:RADio:DMODulation:ARB:TRIGger[:SOURce]?
```

This command sets the trigger source.

For more information on triggering, see ":TRIGger:TYPE" on page 287. The following list describes the command choices:

KEY This choice enables manual triggering by pressing the front-panel **Trigger** hardkey.

EXT An externally applied signal triggers the waveform. This is the only choice that works with gating. The following conditions affect an external trigger:

- The input connector selected for the trigger signal. You have a choice between the rear-panel PATTERN TRIG IN connector or the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector. To make the connector selection, see ":TRIGger[:SOURce]:EXTernal[:SOURce]" on page 292.

  For more information on the connectors and on connecting the cables, see the *E4428C/38C ESG Signal Generators User's Guide*.

- The trigger signal polarity:
  - gating mode, see ":TRIGger:TYPE:GATE:ACTive" on page 289
  - continuous and single modes, see ":TRIGger[:SOURce]:EXTernal:SLOPe" on page 292

- The time delay between when the ESG receives a trigger and when the waveform responds to the trigger. There are two parts to setting the delay:
  - setting the amount of delay, see ":TRIGger[:SOURce]:EXTernal:DELay" on page 291
  - turning the delay on, see ":TRIGger[:SOURce]:EXTernal:DELay:STATe" on page 291

BUS This choice enables triggering over the GPIB or LAN using the `*TRG` or `GET` commands or the AUXILIARY INTERFACE (RS-232) using the `*TRG` command.

***RST** EXT

Key Entry **Trigger Key** **Ext** **Bus**

:TRIGger[:SOURce]:EXTernal:DELay

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:TRIGger[:SOURce]:EXTernal:DELay <val>
[:SOURce]:RADio:DMODulation:ARB:TRIGger[:SOURce]:EXTernal:DELay?
```

This command sets the amount of time to delay the ESG’s response to an external trigger.

The delay is a path (time) delay between when the ESG receives the trigger and when it responds to the trigger. For example, configuring a trigger delay of two seconds, causes the ESG to wait two seconds after receipt of the trigger before the ESG plays the waveform.

The delay does not occur until you turn it on (see “:TRIGger[:SOURce]:EXTernal:DELay:STATe” on page 291). You can set the delay value either before or after turning it on.

For more information on configuring an external trigger source and to select external as the trigger source, see “:TRIGger[:SOURce]” on page 290.

The unit of measurement for the variable <val> is in seconds (nsec–sec).

***RST** +1.00000000E–003

Range 1E–8 to 4E1

Key Entry **Ext Delay Time**

:TRIGger[:SOURce]:EXTernal:DELay:STATe

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:TRIGger[:SOURce]:EXTernal:DELay:
STATe ON|OFF|1|0
[:SOURce]:RADio:DMODulation:ARB:TRIGger[:SOURce]:EXTernal:DELay:STATe?
```

This command enables or disables the external trigger delay function.

For setting the delay time, see “:TRIGger[:SOURce]:EXTernal:DELay” on page 291, and for more information on configuring an external source, see“:TRIGger[:SOURce]” on page 290.

***RST** 0

Key Entry **Ext Delay Off On**

:TRIGger[:SOURce]:EXTernal:SLOPe

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:TRIGger[:SOURce]:EXTernal:
SLOPe POSitive|NEGative
[:SOURce]:RADio:DMODulation:ARB:TRIGger[:SOURce]:EXTernal:SLOPe?
```

This command sets the polarity for an external trigger signal while using the continuous, single triggering mode. To set the polarity for gating, see ":TRIGger:TYPE:GATE:ACTive" on page 289.

The POSitive and NEGative selections correspond to the high (positive) and low (negative) states of the external trigger signal. For example, when you select POSitive, the waveform responds (plays) during the high state of the trigger signal. When the ESG receives multiple trigger occurrences when only one is required, the signal generator uses the first trigger and ignores the rest.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 290.

***RST** NEG

Key Entry **Ext Polarity Neg Pos**

:TRIGger[:SOURce]:EXTernal[:SOURce]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB:TRIGger[:SOURce]:
EXTernal[:SOURce] EPT1|EPT2|EPTRIGGER1|EPTRIGGER2
[:SOURce]:RADio:DMODulation:ARB:TRIGger[:SOURce]:EXTernal[:SOURce]?
```

This command selects which PATTERN TRIG IN connection the ESG uses to accept an externally applied trigger signal when external is the trigger source selection.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 290. For more information on the rear-panel connectors, see the *E4428C/38C ESG Signal Generators User's Guide*.

The following list describes the command choices:

EPT1 This choice is synonymous with EPTRIGGER1 and selects the PATTERN TRIG IN rear-panel connector.

EPT2 This choice is synonymous with EPTRIGGER2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.

EPTRIGGER1 This choice is synonymous with EPT1 and selects the PATTERN TRIG IN rear-panel connector.

EPTRIGGER2 — This choice is synonymous with EPT2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.

***RST** — EPT1

Key Entry — **Patt Trig In 1** **Patt Trig In 2**

[:STATe]

Supported — E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DMODulation:ARB[:STATe] ON|OFF|1|0
[:SOURce]:RADio:DMODulation:ARB[:STATe]?
```

This command enables or disables the digital modulation capability.

ON (1) — This choice sets up the internal hardware to generate the currently selected digital modulation format signal selection.

OFF (0) — This choice disables the digital modulation capability.

***RST** — 0

Key Entry — **Digital Modulation Off On**

Remarks — When ON is selected, the I/Q state is activated and the I/Q source is set to internal.

Dual ARB Subsystem–Option 001/601 or 002/602 ([:SOURce]:RADio:ARB)

:CLIPping

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:CLIPping "<file name>",IJQ|IORQ,<val>[,<val>]
```

This command sets the clipping level of the selected waveform segment to a percentage of its highest peak.

The variable <val> is expressed in units of percent.

IJQ	This choice clips the composite I/Q waveform.
IORQ	This choice clips I and Q separately. When this choice is enabled, percentage values for both I and Q must be specified.
***RST**	IJQ <*val*>: +100
Range	<*val*>: 10–100 (0.1% resolution)
Key Entry	**Clipping Type |I+jQ| |I|,|Q|**
Remarks	A value of 100 percent equates to no clipping.
	Refer to “File Name Variables” on page 13 for information on the file name syntax.

:FILTer:ALPHa

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:FILTer:ALPHa <val>
[:SOURce]:RADio:ARB:FILTer:ALPHa?
```

This command changes the Nyquist or Root Nyquist Real-Time Modulation filter alpha value.

The filter alpha value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001 to 0.999).

***RST**	+3.50000000E–001
Range	0.000 to 1.000
Key Entry	**Filter Alpha**

Key Path	**Mode** > **Dual ARB** > **Arb Setup** > **More 2 of 2** > **Real-Time Modulation Filter** > **Filter Alpha**
Remarks	To change the current filter type, refer to <$elemtext..

:FILTer:BBT

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:FILTer:BBT <val>
[:SOURce]:RADio:ARB:FILTer:BBT?
```

This command changes the bandwidth–multiplied–by–bit–time (BbT) Real-Time Modulation filter parameter.

The filter BbT value can be set to the minimum level (0.1), the maximum level (1), or in between by using fractional numeric values (0.100 to 0.999).

***RST**	+5.00000000E–001
Range	0.100 to 1.000
Key Entry	**Filter BbT**
Key Path	**Mode** > **Dual ARB** > **Arb Setup** > **More 2 of 2** > **Real-Time Modulation Filter** > **Filter BbT**
Remarks	This command is effective only after choosing a Gaussian filter. It does not have an effect on other types of filters.
	To change the current filter type, refer to ":FILTer:TYPE".

:FILTer:CHANnel

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:FILTer:CHANnel EVM|ACP
[:SOURce]:RADio:ARB:FILTer:CHANnel?
```

This command optimizes the Nyquist and Root Nyquist Real-Time Modulation filters to minimize error vector magnitude (EVM) or to minimize adjacent channel power (ACP).

EVM	This choice provides the most ideal passband.
ACP	This choice improves stopband rejection.
***RST**	EVM
Key Entry	**Optimize FIR For EVM ACP**
Key Path	**Mode** > **Dual ARB** > **Arb Setup** > **More 2 of 2 > Real-Time Modulation Filter**

> **Optimize FIR For EVM ACP**

Remarks To change the current filter type, refer to ":FILTer:TYPE".

:FILTer:TYPE

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:FILTer:TYPE
RNYQuist|NYQuist|GAUSsian|RECTangle|IS95|IS95_EQ|IS95_MOD|IS95_MOD_EQ|EW
IDe|WCDMa|AC4Fm|EDGE|EHSR|"user FIR"
[:SOURce]:RADioARB:FILTer:TYPE?
```

This command specifies the Real-Time Modulation filter type.

RNYQuist	This choice selects a Root Nyquist (root raised cosine) filter. This filter is adjusted using Alpha.
NYQuist	This choice selects a Nyquist (raised cosine) filter. This filter is adjusted using Alpha.
GAUSsian	This choice selects a Gaussian filter which is adjusted using Bbt values.
RECTangle	This choice selects a one symbol wide rectangular filter.
IS95	This choice selects a filter that meets the criteria of the IS–95 standard.
IS95_EQ	This choice selects a filter which is a combination of the IS–95 filter (above) and the equalizer filter described in the IS–95 standard. This filter is only used for IS–95 baseband filtering.
IS95_MOD	This choice selects a filter that meets the criteria of the IS–95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS–95 standard.
IS95_MOD_EQ	This choice selects a filter which is a combination of the equalizer filter described in the IS–95 standard and a filter that meets the criteria of the IS–95 error function (for improved adjacent channel performance), with lower passband rejection.
EDGE	This choice selects a linearized Gaussian filter as defined in GSM 05.04.
EWIDe	This choice selects an EDGE spectrally wide pulse shape filter as per 3GPP TS 45.004.
EDGE EHSR	This choice selects an EDGE high symbol rate spectrally narrow pluse shape filter as per 3GPP TS 45.004.
WCDMa	This choice selects a W-CDMA filter which is the equivalent of a Root Nyquist filter with an alpha of 0.22 optimized for ACP.

AC4Fm	This choice selects a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4–level frequency modulation (C4FM) filter.
"<user FIR>"	This variable is any FIR filter file that you have stored in memory. The variable needs no directory path indicating the location of the file, such as `FIR:` or `/USER/FIR`. The command assumes the FIR directory. For more information on file names, refer to "File Name Variables" on page 13.

***RST** Root Nyquist

Key Entry			
	Nyquist	**IS–95**	**EDGE**
	Gaussian	**IS–95 Mod**	**WCDMA**
	User FIR	**IS–95 w/EQ**	**Rectangle**
	Root Nyquist	**IS–95 Mod w/EQ**	**EDGE Wide**
		APCO 25 C4FM	**EDGE EHSR**

Key Path **Mode** > **Dual ARB** > **Arb Setup** > **More 2 of 2** > **Real-Time Modulation Filter** > **Select** > *filter type*

:FILTer[:STATe]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:FILTer[:STATe] ON|{OFF}|1|0
[:SOURce]:RADio:ARB:FILTer[:STATe]?
```

This command enables or disables the **Real-Time Modulation Filter**. This filter is typically applied to an Arb waveform containing just the I/Q symbol decision points. The filter then defines the transitions between the symbol decision points. This means that the filter must have an oversample ratio of two or more. When this feature is active, the Sample Clock Rate is actually the Symbol Rate.

Default Off

Key Entry **Modulation Filter Off On**

Key Path **Mode** > **Dual Arb** > **Arb Set up** > **More 2 of 2** > **Real-Time Modulation Filter (Off)** > **Modulation Filter Off On**

:GENerate:SINE

Supported E4438C with Option 001/ 601or 002/602

```
[:SOURce]:RADio:ARB:GENerate:SINE ["<file_name>"][,<osr>],[<scale>],
[I|Q|IQ]
```

This command creates a sine wave waveform file and saves it in the signal generator's volatile waveform memory (WFM1).

"<file_name>" This variable names the file used to save the generated sine wave data.

<osr>	This variable sets the oversample ratio, which must be an even number and ≥ 4. The <osr> variable is expressed in samples. If the oversample ratio is < 60 (the minimum number of samples or I/Q points required for a waveform), multiple waveform periods are generated to create a waveform file with ≥ 60 samples. The number of periods created is 60 ÷ <osr> (quotient will round up to an integer value). A waveform with an oversample ratio ≥ 60 has one period.
<scale>	This variable sets the scale factor for the waveform. The scale factor is a real number from zero to one.
I|Q|IQ	Selects I, Q, or I and Q paths for the waveform data. Sinewave data is generated and applied to the I path if the I path is selected; Q data are set to zeros. Sine data is generated and applied to the Q path if the Q path is selected; I data are set to zeros. If the I and Q paths are selected, sinewave data are applied to the I and Q paths.

Example

```
:RAD:ARB:GEN:SINE "Sine_Wave",60,.5,IQ
```

The preceding example generates an I/Q sine wave and saves the data to a file named Sine_Wave. The oversampling ratio is 60, the scaling is set for 50%, and the data is applied to both the I and Q paths.

The signal generator's baseband option and available baseband memory determine the maximum number of samples for the waveform.

Range *OSR Option 001/601*: 4E0 – 8E6

OSR Option 002/602: 4E0 – 32E6

Scale: 0–1

:HEADer:CLEar

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:HEADer:CLEar
```

This command clears the header information from the file header used by this modulation format.

Key Entry **Clear Header**

Remarks The **ARB Off On** softkey must be set to On for this command to function.

:HEADER:NOISe:RMS[:OVERride]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:HEADer:NOISe:RMS:OVERride <"filename">, <rms:0 -
```

```
1.414213562373095>|UNSPecified
[:SOURce]:RADio:ARB:HEADer:NOISe:RMS:OVERride? <"filename">
```

This command sets the value of the waveform’s I and Q RMS (root mean square) for noise.

The RMS is used strictly for calculating the relative power of the noise in the specified header. The RMS is specified in normalized linear units with |+1| or |–1| as full scale on I or Q, therefore the largest RMS that can be specified is the square root of 2 (1.414213562). If the value is unspecified, then the waveform file header’s RMS is used.

This value is useful if you wish to have the noise be relative to only a portion of the waveform, such as a pilot channel, or be relative to only a single carrier that is mixed with other carriers.

For setting the header’s RMS value, see “:HEADer:RMS” on page 299.

"<file_name>"	This variable names the waveform file to which the RMS value will be applied. The file name variable can designate a file in the WFM1, NVWFM, or SEQ directories. For information on the file name syntax, refer to “File Name Variables” on page 13.
<value>	This variable is the user–measured RMS noise value for the specified carrier.
`UNSPecified`	Sets RMS as unspecified, which causes the general RMS value to be used for calculating the relative noise power.

Example

```
:RAD:ARB:HEADER:NOISe:RMS:OVER "WFM1:Sine_Wave",.835
```

The preceding example sets the file header RMS noise override value for a file type WFM1, named Sine_Wave, to .835.

```
:RAD:ARB:HEADER:NOISe:RMS:OVER "WFM1:Sine_Wave",UNSP
```

In the second example, the signal generator calculates the RMS, using the waveform file header’s RMS value. For setting the header’s RMS value, see “:HEADer:RMS” on page 299.

The RMS value is expressed in volts.

Key Entry	**Edit Noise RMS Override**	**Unspecified Enter**

:HEADer:RMS

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:HEADER:RMS "<file_name>",<val>|UNSPecified
[:SOURce]:RADio:ARB:HEADER:RMS? "<file_name>"
```

This command sets the file header RMS value for the selected waveform file. The ESG uses the RMS value with the dual ARB’s real-time noise function.

The signal generator reads the RMS value from the file header when real-time noise is enabled and the dual ARB turned on.

When the waveform file is saved from volatile waveform memory (WFM1) to non-volatile waveform memory (NVWFM), the RMS value, auto-calculated or user-defined, is also saved.

"<file_name>" This variable names the waveform file to which the RMS value will be applied. The file name variable can designate a file in the WFM1, NVWFM, or SEQ directories. For information on the file name syntax, refer to “File Name Variables” on page 13.

<val> This variable is the user-measured RMS value for the specified waveform. The following figure shows the RMS calculation.

$$\sqrt{\sum_{n=1}^{N}\left(i_n^2 + q_n^2\right) \times \frac{1}{N}}$$

N = # of Samples

UNSPecified Using this variable in the command clears the RMS value and sets it to unspecified. An unspecified RMS value causes the signal generator to calculate the value when real-time noise is applied to the waveform during play back by the dual ARB player. The RMS calculation includes rise times and does not include consecutive zero level samples. DC offsets and noise are also included in the RMS measurement. Because the signal generator calculation uses so many parameters, you may achieve better results calculating your own RMS value.

Examples

```
[:SOURce]:RADio:ARB:HEADER:RMS "WFM1:Sine_Wave",.835
```

The first example shows a user-measured RMS value for the Sine_Wave waveform file in the waveform’s file header.

```
:RAD:ARB:HEADER:RMS "WFM1:Sine_Wave",UNSP
```

In the second example, the signal generator calculates the RMS value.

The RMS value is expressed in volts.

Range 0 – 1.414213562373095

:HEADer:SAVE

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:HEADer:SAVE
```

This command saves the header information to the file header used by this modulation format.

Key Entry **Save Setup To Header**

Remarks The **ARB Off On** softkey must be set to On for this command to function.

:HCRest[:STATe]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:HCRest[:STATe] ON|OFF|1|0
[:SOURce]:RADio:ARB:HCRest[:STATe]?
```

This command enables or disables the operating state of the high crest mode.

ON(1) This choice turns high crest mode on for arbitrary I/Q waveforms with high crest factors (such as downloaded Signal Studio for 802.11 signals). High crest mode reduces the ALC vernier level by 7.5 dB, allowing the signal generator to process these signals with less distortion and improved EVM. For crest factors higher than 4 dB, I/Q drive levels should be reduced by 1 dB for each dB above that level. In high crest mode, the maximum output level is reduced and power level accuracy is degraded.

OFF(0) This choice disables the high crest mode.

***RST** 0

Key Entry **High Crest Mode Off On**

Remarks The high crest mode is automatically turned on by some Signal Studio applications. You can manually override this automatic selection at any time.

:IQ:EXTernal:FILTer

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:IQ:EXTernal:FILTer 40e6|THRough
[:SOURce]:RADio:ARB:IQ:EXTernal:FILTer?
```

This command selects the filter or through path for I/Q signals routed to the rear panel I and Q outputs. The filter has not effect on the modulated RF signal. Selecting a filter using this command will automatically set ":IQ:EXTernal:FILTer:AUTO" on page 302 to OFF(0) mode.

40e6 This choice applies a 40 MHz baseband filter.

THRough This choice bypasses filtering.

***RST** THR

Key Entry **40.000 MHz** **Through**

:IQ:EXTernal:FILTer:AUTO

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:IQ:EXTernal:FILTer:AUTO ON|OFF|1|0
[:SOURce]:RADio:ARB:IQ:EXTernal:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals routed to the rear panel I/Q outputs.

ON(1) This choice will automatically select a digital modulation filter optimized for the current signal generator settings.

OFF(0) This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to ":IQ:EXTernal:FILTer" on page 302 for selecting a filter or through path.

***RST** 1

Key Entry **I/Q Output Filter Manual Auto**

:IQ:MODulation:ATTen

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:IQ:MODulation:ATTen <val>
[:SOURce]:RADio:ARB:IQ:MODulation:ATTen?
```

This command sets the attenuation level of the I/Q signals being modulated through the signal generator RF path.

The variable <val> is expressed in units of decibels (dB).

***RST** +2.00000000E+000

Range 0–40

Key Entry **Modulator Atten Manual Auto**

:IQ:MODulation:ATTen:AUTO

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:IQ:MODulation:ATTen:AUTO ON|OFF|1|0
[:SOURce]:RADio:ARB:IQ:MODulation:ATTen:AUTO?
```

This command enables or disables the I/Q attenuation auto mode.

ON (1) This choice enables the attenuation auto mode which optimizes the modulator attenuation for the current conditions.

OFF (0) This choice holds the attenuator at its current setting or at a selected value. Refer to ":IQ:MODulation:ATTen" on page 302 for setting the attenuation value.

***RST** 1

Key Entry **Modulator Atten Manual Auto**

:IQ:MODulation:FILTer

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:IQ:MODulation:FILTer 2.1e6|40e6|THRough
[:SOURce]:RADio:ARB:IQ:MODulation:FILTer?
```

This command enables you to select a filter or through path for I/Q signals modulated onto the RF carrier. This filter has no effect on the I/Q signal out the rear panel. Selecting a filter using this command will automatically set ":IQ:MODulation:FILTer:AUTO" on page 304 to OFF(0) mode.

2.1E6 This choice applies a 2.1 MHz baseband filter to the I/Q signals.

40E6 This choice applies a 40 MHz baseband filter to the I/Q signals.

THRough This choice bypasses filtering.

***RST** THR

Key Entry **2.100 MHz** **40.000 MHz** **Through**

:IQ:MODulation:FILTer:AUTO

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:IQ:MODulation:FILTer:AUTO ON|OFF|1|0
[:SOURce]:RADio:ARB:IQ:MODulation:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals modulated onto the RF carrier.

ON(1) This choice will automatically select a digital modulation filter.

OFF(0) This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to “:IQ:MODulation:FILTer” on page 303 for selecting a filter or through path.

***RST** 1

Key Entry **I/Q Mod Filter Manual Auto**

:MARKer:CLEar

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:MARKer:CLEar "<file_name>",<marker>,<first_point>,
<last_point>
```

This command clears a single marker point or a range of marker points on a waveform segment for the selected marker (1–4). The dual ARB player and all of the ARB modulation formats use this command.

"<file_name>" This variable specifies the name of the waveform file in volatile waveform memory (WFM1). Use the AUTOGEN_WAVEFORM file when clearing marker points for an active ARB format. The ESG automatically creates a file, using current settings, and names it AUTOGEN_WAVEFORM whenever an ARB format is turned on (except dual ARB); the same file name is used for all ARB formats. When all ARB formats are off, this file is still in waveform memory (WFM1) and available for use by the dual ARB player. For information on the file name syntax, see “File Name Variables” on page 13.

<marker> This variable selects the marker number; an integer value from one to four.

<first_point> This variable defines the first point in a range of points. The number must be greater than or equal to one, and less than or equal to the total number of waveform points.

If you enter a value for either the first marker point or the last marker point that would make the first marker point occur after the last, the last marker point automatically adjusts to match the first marker point.

<last_point>	This variable defines the last point in a range of points. The number must be greater than or equal to the first point, and less than or equal to the total number of waveform points.

To clear a single marker point, use the same marker point for the first and last point variables. For more information on markers and ARB files, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

Example

```
:RAD:ARB:MARK:CLE "Test_Data",1,1,300
```

The preceding example clears marker 1 from the first point through the 300th point in the Test_Data file.

Range *<marker>*: 1–4

<first_Point>: 1–number of waveform points

<last_point>: <first_Point>–number of waveform points

Key Entry	**Set Marker Off Range Of Points**	**Marker 1 2 3 4**	**First Mkr Point**	**Last Mkr Point**

:MARKer:CLEar:ALL

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:MARKer:CLEar:ALL "<file_name>",<marker>
```

This command clears all marker points on a waveform segment for the selected marker (1–4). The dual ARB player and all of the ARB formats use this command. With all marker points cleared, the event output signal level is set low.

"<file_name>"	This variable specifies the name of the waveform file in volatile waveform memory (WFM1). Use the AUTOGEN_WAVEFORM file when clearing all marker points for the currently active ARB format. The ESG automatically creates a file, using current settings, and names it AUTOGEN_WAVEFORM whenever an ARB format is turned on (except dual ARB); the same file name is used for all ARB formats. When all ARB formats are off, this file is still in waveform memory (WFM1) and available for use by the dual ARB player. For information on the file name syntax, see "File Name Variables" on page 13.
<marker>	This variable selects the marker number; an integer value from one to four.

Example

```
:RAD:ARB:MARK:CLE:ALL "Test_Data",1
```

The preceding example clears marker 1 from the all waveform points in the Test_Data file.

Range 1–4

Key Entry	**Marker 1 2 3 4**	**Set Marker Off All Points**

:MARKer:ROTate

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:MARKer:ROTate "<file_name>",<rotate_count>
```

This command shifts the marker points for all markers in a waveform segment earlier or later by the value of the <rotate_count> variable. The dual ARB player and all of the ARB formats use this command.

You can use a positive or negative value. When a marker point is close to the end of the waveform and the <rotate_count> value is greater than the number of remaining marker points, but less than the total number of marker points, the marker points that would move beyond the end of the waveform wrap to the beginning of the waveform. For example, if a marker point resides at sample point 195 out of 200, and the <rotate_count> value is twenty-five, the marker point wraps to the beginning of the waveform and continues out to the twentieth waveform point.

To set the marker points in a waveform, refer to ":MARKer:[SET]" on page 306.

"<file_name>" This variable specifies the name of the waveform file in volatile waveform memory (WFM1). Use the AUTOGEN_WAVEFORM file when rotating marker points for the currently active ARB format and then save the file using a different file name. The ESG automatically creates a file, using current settings, and names it AUTOGEN_WAVEFORM whenever an ARB format is turned on (except dual ARB); the same file name is used for all ARB formats. When all ARB formats are off, this file is still in waveform memory (WFM1) and available for use by the dual ARB player. For information on the file name syntax, see "File Name Variables" on page 13.

Example

```
:RAD:ARB:MARK:ROT "Test_Data",100
```

The preceding example shifts all markers set in the Test_Data file 100 points later. If the first set point in the file is at 50, then after sending this command, the first set point will be 150 (assuming the Test_Data file has at least 150 points) and no later set points wrapped around to the beginning of the file.

Range – (n – 1) to (n – 1)

n = number of points in the waveform

:MARKer:[SET]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:MARKer:[SET] "<file_name>",<marker>,<first_point>,
<last_point>,<skip_count>
```

This command sets a single marker point or a range of marker points on a waveform segment for the selected marker (1–4). The dual ARB player and all of the ARB formats use this command.

The ESG provides four independent markers. Each marker routes an output signal to the rear-panel event connector number (BNC—EVENT 1 and EVENT 2 or AUXILIARY I/O—EVENT 3 and EVENT 4) that corresponds to the marker number. A marker consists of marker points placed at defined sample points in a waveform segment. This means that a marker point cannot be less than one or greater than the last sample point in the waveform. Marker points are cumulative, so multiple command executions with different range values, without first clearing the existing points, places additional marker points on the waveform. Because of this cumulative behavior, it is a good practice to clear existing marker points prior to setting new points. This will eliminate unexpected marker pulses. Refer to ":MARKer:CLEar" on page 304 and ":MARKer:CLEar:ALL" on page 305 for information on clearing marker points.

For waveforms generated on the signal generator (baseband generator), the ESG automatically places a marker point at the first waveform sample for markers one and two.

NOTE You can set markers for either positive or negative polarity. The following discussions for this command assume positive marker polarity. When using negative marker polarity, the marker pulses occur during the periods of no marker points.

There are three ways to place marker points using this command:

- consecutive marker points over a range that collectively create a single marker pulse that spans the range
- equally spaced marker points over a range, so that a marker pulse occurs at each sample point that coincides with a marker point (Using this method, you can configure a clock signal by setting the <skip_count> variable to one.)
- a single marker point placed at a specific sample point in the waveform, which outputs a single pulse relative to the marker point location (To configure a single marker point, set the first and last points to the same number.)

For more information on markers, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

The following list describes the command variables:

"<file_name>" This variable specifies the name of the waveform file in volatile waveform memory (WFM1). Use the AUTOGEN_WAVEFORM file when setting marker points for the currently active ARB format and then save the file using a different file name. The ESG automatically creates a file, using current settings, and names it AUTOGEN_WAVEFORM whenever an ARB format is turned on (except dual

	ARB); the same file name is used for all ARB formats. When all ARB formats are off, this file is still in waveform memory (WFM1) and available for use by the dual ARB player. For information on the file name syntax, see “File Name Variables” on page 13.
<marker>	This variable selects the marker number; an integer value from one to four.
<first_point>	This variable defines the first point in the range over which the marker is placed. This number must be greater than or equal to one, and less than or equal to the total number of waveform points. If you enter a value for either the first marker point or the last marker point that would make the first marker point occur after the last, the last marker point is automatically adjusted to match the first marker point.
<last_point>	This variable defines the last point in the range over which the marker will be placed. This value must be greater than or equal to the first point, and less than or equal to the total number of waveform points.
<skip_count>	This variable defines the marker point pattern across the range. A zero value means the marker points occur consecutively across the range. A value greater than zero creates a repeating marker point pattern across the range, where the gap between the marker points is equal to the <skip_count> value. The gaps begin after the first marker point. Each marker point in the pattern, which is only one point wide, produces a marker pulse.

Example

```
:RAD:ARB:MARK "Test_Data",1,40,100,2
```

The preceding example sets marker 1 on the first point, 40, the last point, 100, and every third point (skip 2) between 40 and 100 (assuming the Test_Data file has at least 100 points).

Range

<marker>: 1–4

<first_Point>: 1–number of waveform points

<last_point>: <first_Point>–number of waveform points

<skip_count>: 0–number of points in the range

Key Entry

Set Marker on Range Of Points **Marker 1 2 3 4** **First Mkr Point** **Last Mkr Point**

 # Skipped Points **Apply to Waveform**

:MDEStination:AAMPlitude

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:MDEStination:AAMPlitude NONE|M1|M2|M3|M4
[:SOURce]:RADio:ARB:MDEStination:AAMPlitude?
```

This command routes the selected marker to the Alternate Amplitude function. The `NONE` parameter clears the marker for the Alternate Amplitude function.

***RST** NONE

Key Entry **None** **Marker 1** **Marker 2** **Marker 3** **Marker 4**

:MDEStination:ALCHold

Supported E4438C with Option 001/601or 002/602

CAUTION Incorrect automatic level control (ALC) sampling can create a sudden unleveled condition that may create a spike in the RF output potentially damaging a DUT or connected instrument. Ensure that you set markers to let the ALC sample over an amplitude that accounts for the high power levels within the signal.

```
[:SOURce]:RADio:ARB:MDEStination:ALCHold NONE|M1|M2|M3|M4
[:SOURce]:RADio:ARB:MDEStination:ALCHold?
```

This command enables or disables the marker ALC hold function for the selected marker. For setting markers, see ":MARKer:[SET]" on page 306.

Use the ALC hold function when you have a waveform signal that incorporates idle periods, or when the increased dynamic range encountered with RF blanking is not desired. The ALC leveling circuitry responds to the marker signal during the marker pulse (marker signal high), averaging the modulated signal level during this period.

The ALC hold function operates during the low periods of the marker signal. The marker polarity determines when the marker signal is high. For a positive polarity, this is during the marker points. For a negative polarity, this is when there are no marker points. For setting a marker's polarity, see ":MPOLarity:MARKer1|2|3|4" on page 312.

NOTE Do not use the ALC hold for more than 100 ms, because it can affect the waveform's output amplitude.

The marker signal has a minimum of a two-sample delay in its response relative to the waveform signal response. To compensate for the marker signal delay, offset marker points from the waveform sample point at which you want the ALC sampling to begin.

The ALC hold setting is part of the file header information, so saving the setting to the file header saves the current marker routing for the waveform file.

NOTE	A waveform file that has unspecified settings in the file header uses the previous waveform's routing settings.

For more information on the marker ALC hold function, see the *E4428C/38C ESG Signal Generators User's Guide*. For setting the marker points, see ":MARKer:[SET]" on page 306.

NONE This terminates the marker ALC hold function.

M1–M4 These are the marker choices. The ALC hold feature uses only one marker at a time.

***RST** NONE

Example

`:RAD:ARB:MDES:ALCH M1`

The preceding example routes marker 1 to the ALC Hold function.

Key Entry	**None**	**Marker 1**	**Marker 2**	**Marker 3**	**Marker 4**

Remarks N/A

:MDEStination:PULSe

Supported E4438C with Option 001/601or 002/602

CAUTION	The pulse function incorporates ALC hold. Incorrect automatic level control (ALC) sampling can create a sudden unleveled condition that may create a spike in the RF output potentially damaging a DUT or connected instrument. Ensure that you set markers to let the ALC sample over an amplitude that accounts for the high power levels within the signal.

```
[:SOURce]:RADio:ARB:MDEStination:PULSe NONE|M1|M2|M3|M4
[:SOURce]:RADio:ARB:MDEStination:PULSe?
```

This command enables or disables the marker pulse/RF blanking function for the selected marker.

This function automatically uses the ALC hold function, so there is no need to select both the ALC hold and pulse/RF blanking functions for the same marker.

NOTE Do not use ALC hold for more than 100 ms, because it can affect the waveform's output amplitude.

The signal generator blanks the RF output when the marker signal goes low. The marker polarity determines when the marker signal is low. For a positive polarity, this is during the marker points. For a negative polarity, this is when there are no marker points. For setting a marker's polarity, see ":MPOLarity:MARKer1|2|3|4" on page 312.

NOTE Set marker points prior to using this function. Enabling this function without setting marker points may create a continuous low or high marker signal, depending on the marker polarity. This causes either no RF output or a continuous RF output. See ":MARKer:[SET]" on page 306 for setting the marker points.

The marker signal has a minimum of a two-sample delay in its response relative to the waveform signal response. To compensate for the marker signal delay, offset marker points from the waveform sample point at which you want the RF blanking to begin. The RF blanking setting is part of the file header information, so saving the setting to the file header saves the current marker routing for the waveform file.

NOTE A waveform file that has unspecified settings in the file header uses the previous waveform's routing settings. This could create the situation where there is no RF output signal, because the previous waveform used RF blanking.

For more information on the marker RF blanking function, see the *E4428C/38C ESG Signal Generators User's Guide*.

NONE This terminates the marker RF blanking/pulse function.

M1–M4 These are the marker choices. The RF blanking/pulse feature uses only one marker at a time.

Example

`:RAD:ARB:MDES:PULS M2`

The preceding example routes marker 2 to Pulse/RF Blanking.

***RST** NONE

Key Entry **None** **Marker 1** **Marker 2** **Marker 3** **Marker 4**

:MPOLarity:MARKer1|2|3|4

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:MPOLarity:MARKer1|2|3|4 NEGative|POSitive
[:SOURce]:RADio:ARB:MPOLarity:MARKer1|2|3|4?
```

This command sets the polarity for the selected marker. For a positive marker polarity, the marker signal is high during the marker points. For a negative marker polarity, the marker signal is high during the period of no marker points.

Example

:RAD:ARB:MPOL:MARK3 NEG

The preceding example sets the polarity for marker 3 to negative.

***RST** POS

Key Entry **Marker 1 Polarity Neg Pos** **Marker 2 Polarity Neg Pos** **Marker 3 Polarity Neg Pos**

Marker 4 Polarity Neg Pos

:NOISe:BFACtor

Supported E4438C with Option 403

```
[:SOURce]:RADio:ARB:NOISe:BFACtor 1|2
[:SOURce]:RADio:ARB:NOISe:BFACtor?
```

This command sets the flat noise bandwidth for the real-time noise applied to the waveform.

1 This sets the noise bandwidth to at least 0.8 times the sample rate.

2 This sets the noise bandwidth to at least 1.6 times the sample rate, with a maximum bandwidth of 80 MHz.

NOTE For the bandwidth factor of 2, 50 MHz is the maximum sample rate. If 2 is the current selection, you cannot set the sample rate above 50 MHz, and if the sample rate is above 50 MHz, you cannot select 2. See “:SCLock:RATE” on page 317 for setting the sample rate.

The flat noise bandwidth increases with any oversampling by a factor equal to the oversampling amount.

Example

`:RAD:ARB:NOIS:BFAC 2`

The preceding example sets the bandwidth factor to 2 and increases the flat noise bandwidth by at least 1.6 times the ARB sample clock rate.

***RST** +1

Key Entry **Noise Bandwidth Factor**

:NOISe:CBWidth

Supported E4438C with Option 403

```
[:SOURce]:RADio:ARB:NOISe:CBWidth <val><unit>
[:SOURce]:RADio:ARB:NOISe:CBWidth?
```

This command selects the carrier bandwidth over which the additive white gaussian noise (AWGN) is applied. The noise power will be integrated over the selected bandwidth for the purposes of calculating carrier to noise ratio (C/N). The carrier bandwidth is limited to the ARB sample rate, but cannot exceed 80 MHz. For more information, refer to “:NOISe[:STATe]” and “:NOISe:BFACtor”.

***RST** +1.00000000E+000

Range 1HZ–80 MHZ

Key Entry **Carrier Bandwidth**

:NOISe:CN

Supported E4438C with Option 403

```
[:SOURce]:RADio:ARB:NOISe:CN <val><unit>
[:SOURce]:RADio:ARB:NOISe:CN?
```

This command sets the carrier to noise ratio (C/N) in dB. The carrier power is defined as the total modulated signal power without noise power added. The noise power is applied over the specified bandwidth of the carrier signal. For more information, refer to “:NOISe:CBWidth” on page 313.

Example

`:RAD:ARB:NOIS:CN 50DB`

The preceding example sets the carrier to noise ratio to 50 dB.

***RST** +0.00000000E+000

Range –100 to 100DB

Key Entry **Carrier to Noise Ratio**

:NOISe[:STATe]

Supported E4438C with Option 403

```
[:SOURce]:RADio:ARB:NOISe[:STATe] ON|OFF|1|0
[:SOURce]:RADio:ARB:NOISe[:STATe]?
```

This command enables or disables adding real-time additive white gaussian noise (AWGN) to the carrier modulated by the waveform being played by the dual ARB waveform player. The noise bandwidth will be at least 0.8 times the sample rate, or 1.6 times the sample rate depending on the bandwidth factor. For information on the bandwidth factor, refer to ":NOISe:BFACtor".

When the bandwidth factor is 2 and the sample rate is greater than 50 megasamples per/second, noise cannot be enabled. Maximum bandwidth cannot exceed 80 MHz. Any oversampling in the waveform increases the noise bandwidth by a factor equal to the oversampling.

Example

:RAD:ARB:NOIS ON

The preceding example applies real-time AWGN to the carrier.

***RST** 0

Key Entry **Real-time Noise Off On**

:REFerence:EXTernal:FREQuency

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:REFerence:EXTernal:FREQuency <value>
[:SOURce]:RADio:ARB:REFerence:EXTernal:FREQuency?
```

This command enters the frequency of the applied external reference.

The variable <val> is expressed in units of Hertz (Hz–MHz).

***RST** +1.00000000E+007

Range 2.5E5–1E8

Key Entry **Reference Freq**

Remarks The value specified by this command is effective only when you are using an external ARB reference applied to the BASEBAND GEN REF IN rear panel connector.

To specify external as the ARB reference source type, refer to ":REFerence[:SOURce]" on page 315.

:REFerence[:SOURce]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:REFerence[:SOURce] INTernal|EXTernal
[:SOURce]:RADio:ARB:REFerence[:SOURce]?
```

This command selects either an internal or external reference for the waveform clock.

***RST** INT

Key Entry **ARB Reference Ext Int**

Remarks If the EXTernal choice is selected, the external frequency value *must* be entered and the signal must be applied to the BASEBAND GEN REF IN rear panel connector.

Refer to ":REFerence:EXTernal:FREQuency" on page 314 to enter the external reference frequency.

:RETRigger

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:RETRigger ON|OFF|1|0|IMMediate
[:SOURce]:RADio:ARB:RETRigger?
```

This command enables or disables the ARB retriggering mode; the retrigger mode controls how the retriggering function performs while a waveform is playing.

ON (1) This choice specifies that if a trigger occurs while a waveform is playing, the waveform will retrigger at the end of the current waveform sequence and play once more.

OFF (0) This choice specifies that if a trigger occurs while a waveform is playing, the trigger will be ignored.

IMMediate This choice specifies that if a trigger occurs while a waveform is playing, the waveform will reset and replay from the start immediately upon receiving a trigger.

***RST** ON

Key Entry **On** **Off** **Immediate**

:RSCAling

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:RSCaling <val>
[:SOURce]:RADio:ARB:RSCaling?
```

This command adjusts the scaling value that is applied to a waveform while it is playing. The variable <val> is expressed as a percentage. Runtime scaling does not alter the waveform data file. For more information about runtime scaling, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

Example

`:RAD:ARB:RSC 50`

The preceding example applies a 50% scaling factor to the selected waveform.

***RST** +7.00000000E+001

Range 1–100

Key Entry **Waveform Runtime Scaling**

Remarks Runtime scaling does not alter the waveform data file.

:SCALing

Supported E84438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:SCALing "<file_name>",<val>
```

This command scales the designated "<file_name>" waveform file while it is being played by the dual ARB player. The variable <val> is expressed as a percentage, 1–100%. For information on file name syntax, see "File Name Variables" on page 13.

Scaling is additive and permanent. You cannot scale up. If you scale a waveform file by 60% and then scale it again to 80% you will scale down the 60% waveform file. For more information about waveform file scaling, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

Example

`:RAD:ARB:SCAL "Test_Data", 50`

The preceding example applies a 50% scaling factor to the Test_Data waveform file.

Range 1–100

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

Key Entry **Scaling** **Scale Waveform Data**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:SCLock:RATE

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:SCLock:RATE <val>
[:SOURce]:RADio:ARB:SCLock:RATE?
```

This command sets the sample clock rate for the dual ARB format.

The variable <val> is expressed in units of hertz.

***RST** +1.00000000E+008

Range 1–1E8

Key Entry **ARB Sample Clock**

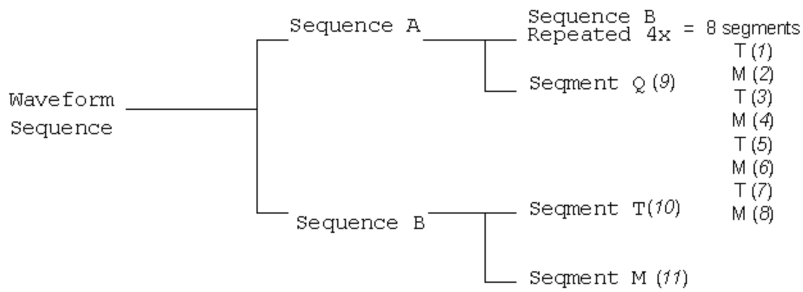
:SEQuence

Supported All with Option 001/601 or 002/602

```
[:SOURce]:RADio:ARB:SEQuence
"<file_name>","<waveform1>",<reps>,NONE|M1|M2|M3|M4|M1M2|M1M3|M1M4|M2M3|
M2M4|M3M4|M1M2M3|M1M2M4|M1M3M4|M2M3M4|ALL,{"<waveform2>",<reps>,NONE|M1|
M2|M3|M4|M1M2|M1M3|M1M4|M2M3|M2M4|M3M4|M1M2M3|M1M2M4|M1M3M4|M2M3M4|ALL}
[:SOURce]:RADio:ARB:SEQuence? "<file_name>"
```

This command creates a waveform sequence. A waveform sequence is made up of segments and other sequences. Any number of segments, up to a segment count limit of 32768, can be used to create a sequence. The count limit is determined by the number of segments in the waveform sequence. Repeated segments are included in the count limit.

For example, using the figure below, suppose a waveform is created using two sequences: Sequence_A and Sequence_B. Sequence_A consists of Sequence_B and Segment_Q with Sequence_B repeated four times. The total segment count for this waveform sequence would be eleven.



The query returns the contents and segment settings of the waveform sequence file

The segments and sequences play in the same order as placed into the waveform sequence by the command. Once you create the file, you cannot edit the segment settings or add further waveform segments unless you use the signal generator’s front panel. Using the same waveform sequence name overwrites the existing file with that name. To use a segment’s marker settings, you must enable the segment’s markers within the segment or within the waveform sequence. A sequence is stored in the catalog of SEQ files USER/SEQ or SEQ: directory.

When you create a waveform sequence, the ESG also creates a file header for the sequence. This file header takes priority over segment or nested sequence file headers. Refer to the *E4428C/38C ESG Signal Generators User’s Guide* for more information on file headers. To save the file header, see “:HEADer:SAVE” on page 301.

"<file_name>" This variable names the waveform *sequence* file. For information on the file name syntax, see “File Name Variables” on page 13.

"<waveform1>" This variable specifies the name of an existing waveform *segment* or sequence file. A waveform segment or the waveform segments in a specified sequence must reside in volatile memory, WFM1, before it can be played by the dual ARB player. For information on the file name syntax, see “File Name Variables” on page 13, and for more information on waveform segments, see the *E4428C/38C ESG Signal Generators User’s Guide*.

"<waveform2>" This variable specifies the name of a second existing waveform *segment* or sequence file. The same conditions required for waveform1 apply for this segment or sequence. Additional segments and other sequences can be inserted into the file.

<reps> This variable sets the number of times a segment or sequence plays (repeats) before the next segment or sequence plays.

NONE	This choice disables all four markers for the waveform. Disabling markers means that the waveform sequence ignores the segment's or sequence's marker settings.
M1, M2, M3, M4	These choices, either individually or a combination of them, enable the markers for the waveform segment or sequence. Markers not specified are ignored for that segment or sequence.
ALL	This choice enables all four markers in the waveform segment or sequence.

Example

`:RAD:ARB:SEQ` "SEQ:Test_Data","WFM1:ramp_test_wfm",25,M1M4,
"WFM1:sine_test_wfm",100,ALL

NOTE A carriage return or line feed is never included in a SCPI command. The example above contains a carriage return so that the text will fit on the page.

The preceding example creates a waveform sequence file named Test_Data. This file consists of the factory-supplied waveform segments, ramp_test_wfm and sine_test_wfm. The waveform is stored in the signal generator's SEQ: directory.

- The first segment, ramp_test_wfm, has 25 repetitions with markers 1 and 4 enabled.
- The second segment, sine_test_wfm, has 100 repetitions with all four markers enabled.

Range <reps>: 1–65535

Key Entry **Build New Waveform Sequence** **Name and Store** **Insert Waveform**

Edit Repetitions **Toggle Marker 1** **Toggle Marker 2** **Toggle Marker 3**

Toggle Marker 4

:TRIGger:TYPE

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:TRIGger:TYPE CONTinuous|SINGle|GATE|SADVance
[:SOURce]:RADio:ARB:TRIGger:TYPE?
```

This command sets the trigger mode (type) that controls the waveform's playback.

Triggers control the playback by telling the ESG when to play the modulating signal (waveform). Depending on the trigger settings for the ESG, the waveform playback can occur once, continuously, or the ESG may start and stop playing the waveform repeatedly (GATE mode).

A trigger signal comprises both positive and negative signal transitions (states), which are also called high and low periods. You can configure the ESG to trigger on either state of the trigger signal. It is common to have multiple triggers, also referred to as trigger occurrences or events, occur when the signal generator requires only a single trigger. In this situation, the ESG recognizes the first trigger and ignores the rest.

When you select a trigger mode, you may lose the signal (carrier plus modulating) from the RF output until you trigger the waveform. This is because the ESG sets the I and Q signals to zero volts prior to the first trigger event, which suppresses the carrier. After the first trigger event, the waveform's final I and Q levels determine whether you will see the carrier signal or not (zero = no carrier, other values = carrier visible). At the end of most files, the final I and Q points are set to a value other than zero.

There are four parts to configuring the trigger:

- Choosing the trigger type, which controls the waveform's transmission.
- Setting the waveform's response to triggers:
  - CONTinuous, see ":TRIGger:TYPE:CONTinuous[:TYPE]" on page 321
  - SINGle, see ":RETRigger" on page 315
  - GATE, selecting the mode also sets the response
- Selecting the trigger source (see ":TRIGger[:SOURce]" on page 324), which determines how the ESG receives its trigger signal, internally or externally. The GATE choice requires an external trigger.
- Setting the trigger polarity when using an external source:
  - CONTinuous and SINGle see ":TRIGger[:SOURce]:EXTernal:SLOPe" on page 326
  - GATE, see ":TRIGger:TYPE:GATE:ACTive" on page 321

For more information on triggering, see the *E4428C/38C ESG Signal Generators User's Guide*.

The following list describes the trigger type command choices:

CONTinuous	Upon triggering, the waveform repeats continuously.
SINGle	Upon triggering, the waveform segment or sequence plays once.
GATE	An external trigger signal repeatedly starts and stops the waveform's playback (transmission). The time duration for playback depends on the duty period of the trigger signal and the gate polarity selection (see ":TRIGger:TYPE:GATE:ACTive" on page 321). The waveform plays during the inactive state and stops during the active polarity selection state. The active state can be set high or low. The gate mode works only with an external trigger source.

NOTE The ARB gating behavior described above is opposite to the gating behavior for real-time custom mode.

***RST**	CONT
Key Entry	**Continuous** **Single** **Gate** **Segment Advance**

:TRIGger:TYPE:CONTinuous[:TYPE]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:TRIGger:TYPE:CONTinuous[:TYPE] FREE|TRIGger|RESet
[:SOURce]:RADio:ARB:TRIGger:TYPE:CONTinuous[:TYPE]?
```

This commands selects the waveform's response to a trigger signal while using the continuous trigger mode.

For more information on triggering and to select the continuous trigger mode, see ":TRIGger:TYPE" on page 319.

The following list describes the waveform's response to each of the command choices:

FREE	Turning the ARB format on immediately triggers the waveform. The waveform repeats until you turn the format off, select another trigger, or choose another waveform file.
TRIGger	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously until you turn the format off, select another trigger, or choose another waveform file.
RESet	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously. Subsequent triggers reset the waveform to the beginning. For a waveform sequence, this means to the beginning of the first segment in the sequence.
***RST**	FREE
Key Entry	**Free Run** **Trigger & Run** **Reset & Run**

:TRIGger:TYPE:GATE:ACTive

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:TRIGger:TYPE:GATE:ACTive LOW|HIGH
[:SOURce]:RADio:ARB:TRIGger:TYPE:GATE:ACTive?
```

This command selects the active state (gate polarity) of the gate while using the gating trigger mode.

The LOW and HIGH selections correspond to the low and high states of an external trigger signal. For example, when you select HIGH, the active state occurs during the high of the trigger signal. When the active state occurs, the ESG stops the waveform playback at the last played sample point, then restarts the playback at the next sample point when the inactive state occurs. For more information on triggering and to select gating as the trigger mode, see ":TRIGger:TYPE" on page 319.

The following list describes the ESG's gating behavior for the polarity selections:

LOW	The waveform playback stops when the trigger signal goes low (active state) and restarts when the trigger signal goes high (inactive state).
HIGH	The waveform playback stops when the trigger signal goes high (active state) and restarts when the trigger signal goes low (inactive state).
***RST**	HIGH
Key Entry	**Gate Active Low High**

:TRIGger:TYPE:SADVance[:TYPE]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:TRIGger:TYPE:SADVance[:TYPE] SINGle|CONTinuous
[:SOURce]:RADio:ARB:TRIGger:TYPE:SADVance[:TYPE]?
```

This command customizes the segment advance trigger type setting.

SINGle	This choice will play the next segment in the sequence only once.
CONTinuous	This choice will instruct the sequencer to continually play the next segments in the waveform sequence in a continuous pattern.
***RST**	CONT
Key Entry	**Single** **Continuous**
Remarks	This command is valid when SADVance has been selected as the trigger type.
	To select SADVance as the trigger type, refer to ":TRIGger:TYPE" on page 319.

:TRIGger:TYPE:SADVance[:TYPE]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:TRIGger:TYPE:SADVance[:TYPE] SINGle|CONTinuous
[:SOURce]:RADio:ARB:TRIGger:TYPE:SADVance[:TYPE]?
```

This commands selects the waveform's response to a trigger signal while using the segment advance (SADVance) trigger mode.

When the ESG receives multiple trigger occurrences when only one is required, the signal generator uses the first trigger and ignores the rest. For more information on triggering and to select segment advance as the trigger mode, see ":TRIGger:TYPE" on page 319.

The following list describes the waveform’s response to each of the command choices:

SINGle — Each segment in the sequence requires a trigger to play, and a segment plays only once, ignoring a segment’s repetition value (see “:SEQuence” on page 317 for repetition information). The following list describes a sequence’s playback behavior with this choice:

- After receiving the first trigger, the first segment plays to completion.
- When the waveform receives a trigger after a segment completes, the sequence advances to the next segment and plays that segment to completion.
- When the waveform receives a trigger during play, the current segment plays to completion. Then the sequence advances to the next segment, and it plays to completion.
- When the waveform receives a trigger either during or after the last segment in a sequence plays, the sequence resets and the first segment plays to completion.

CONTinuous — Each segment in the sequence requires a trigger to play. After receiving a trigger, a segment plays continuously until the waveform receives another trigger. The following list describes a sequence’s playback behavior with this choice:

- After receiving the first trigger, the first segment plays continuously.
- A trigger during the current segment play causes the segment to play to the end of the segment file, then the sequence advances to the next segment, which plays continuously.
- When last segment in the sequence receives a trigger, the sequence resets and the first segment plays continuously.

Example

`:RAD:ARB:TRIG:TYPE:SADV CONT`

The preceding example selects the continuous segment advance mode.

***RST** CONT

Key Entry **Single** **Continuous**

:TRIGger[:SOURce]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:TRIGger[:SOURce] KEY|EXT|BUS
[:SOURce]:RADio:ARB:TRIGger[:SOURce]?
```

This command sets the trigger source.

For more information on triggering, see ":TRIGger:TYPE" on page 319. The following list describes the command choices:

KEY This choice enables manual triggering by pressing the front-panel **Trigger** hardkey.

EXT An externally applied signal triggers the waveform. This is the only choice that works with gating. The following conditions affect an external trigger:

- The input connector selected for the trigger signal. You have a choice between the rear-panel PATTERN TRIG IN connector or the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector. To make the connector selection, see ":TRIGger[:SOURce]:EXTernal[:SOURce]" on page 327.

  For more information on the connectors and on connecting the cables, see the *E4428C/38C ESG Signal Generators User's Guide*.

- The trigger signal polarity:

  — gating mode, see ":TRIGger:TYPE:GATE:ACTive" on page 321
  — continuous and single modes, see ":TRIGger[:SOURce]:EXTernal:SLOPe" on page 326

- The delay between when the ESG receives a trigger and when the waveform responds to the trigger. There are two parts to setting the delay:

  — setting the amount of delay, see ":TRIGger[SOURce]:EXTernal:DELay[:TIME]" on page 326 or ":TRIGger[:SOURce]:EXTernal:DELay:SAMPles" on page 325
  — turning the delay on, see ":TRIGger[:SOURce]:EXTernal:DELay:STATe" on page 325

BUS This choice enables triggering over the GPIB or LAN using the `*TRG` or `GET` commands or the AUXILIARY INTERFACE (RS-232) using the `*TRG` command.

***RST** EXT

Key Entry **Trigger Key** **Ext** **Bus**

:TRIGger[:SOURce]:EXTernal:DELay:SAMPles

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:TRIGger[:SOURce]:EXTernal:DELay:SAMPles <val>
[:SOURce]:RADio:ARB:TRIGger[:SOURce]:EXTernal:DELay:SAMPles?
```

This command sets the number of samples to delay the ESG’s response to an external trigger.

The delay is between when the ESG receives the trigger and when it responds to the trigger. For example, configuring a trigger delay of 100 samples, causes the ESG to wait 100 samples after receipt of the external trigger before the ESG plays the waveform. The delay does not occur until you select SAMPles as the delay type. For more information, see “:TRIGger[:SOURce]:EXTernal:DELay:STATe” on page 325). You can set the delay value either before or after selecting SAMPles.

For more information on configuring an external trigger source and to select external as the trigger source, see “:TRIGger[:SOURce]” on page 324.

The unit of measurement for the variable <val> is in samples.

***RST** +0

Range 0–100E6

Key Entry **Ext Delay Samples**

:TRIGger[:SOURce]:EXTernal:DELay:STATe OFF|ON|1|0

Supported E4438C with Option 001/601or 002/602

NOTE Refer to the *Programming Compatibility Guide* for information on this command. This command was replaced by the “:TRIGger[:SOURce]:EXTernal:DELay:STATe” command.

:TRIGger[:SOURce]:EXTernal:DELay:STATe

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:TRIGger[:SOURce]:EXTernal:DELay:STATe OFF|TIME|
SAMPles
[:SOURce]:RADio:ARB:TRIGger[:SOURce]:EXTernal:DELay:STATe?
```

This command enables the delay feature by selecting the external trigger delay type or disables the external trigger delay function.

TIME	Selects time as the delay value in units of nanoseconds to seconds. For setting the time delay value, see “:TRIGger[SOURce]:EXTernal:DELay[:TIME]” on page 326.
SAMPles	Selects samples as the delay value. For setting the sample delay value, see “:TRIGger[:SOURce]:EXTernal:DELay:SAMPles” on page 325.

For information on configuring an external source, see“:TRIGger[:SOURce]” on page 324.

***RST** OFF

Key Entry **Ext Delay** **Off** **Time** **Samples**

:TRIGger[SOURce]:EXTernal:DELay[:TIME]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:TRIGger[:SOURce]:EXTernal:DELay[:TIME] <val>
[:SOURce]:RADio:ARB:TRIGger[:SOURce]:EXTernal:DELay[:TIME]?
```

This command sets the amount of time to delay the ESG’s response to an external trigger.

The delay is a path (time) delay between when the ESG receives the trigger and when it responds to the trigger. For example, configuring a trigger delay of two seconds, causes the ESG to wait two seconds after receipt of the trigger before the ESG plays the waveform. The delay does not occur until you select TIME as the delay type. For more information, see “:TRIGger[:SOURce]:EXTernal:DELay:STATe” on page 325. You can set the delay value either before or after selecting TIME.

For more information on configuring an external trigger source and to select external as the trigger source, see “:TRIGger[:SOURce]” on page 324.

The unit of measurement for the variable <val> is in seconds (nsec–sec).

***RST** +1.00000000E–003

Range 1E–8 to 4E1

Key Entry **Ext Delay Time**

:TRIGger[:SOURce]:EXTernal:SLOPe

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:TRIGger[:SOURce]:EXTernal:SLOPe POSitive|NEGative
[:SOURce]:RADio:ARB:TRIGger[:SOURce]:EXTernal:SLOPe?
```

This command sets the polarity for an external trigger signal while using the continuous, single triggering mode. To set the polarity for gating, see “:TRIGger:TYPE:GATE:ACTive” on page 321.

The POSitive and NEGative selections correspond to the high (positive) and low (negative) states of the external trigger signal. For example, when you select POSitive, the waveform responds (plays) during the high state of the trigger signal. When the ESG receives multiple trigger occurrences when only one is required, the signal generator uses the first trigger and ignores the rest.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 324.

***RST** NEG

Key Entry **Ext Polarity Neg Pos**

:TRIGger[:SOURce]:EXTernal[:SOURce]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:TRIGger[:SOURce]:EXTernal[:SOURce] EPT1|EPT2|
EPTRIGGER1|EPTRIGGER2
[:SOURce]:RADio:ARB:TRIGger[:SOURce]:EXTernal[:SOURce]?
```

This command selects which PATTERN TRIG IN connection the ESG uses to accept an externally applied trigger signal when external is the trigger source selection.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 324. For more information on the rear-panel connectors, see the *E4428C/38C ESG Signal Generators User's Guide*.

The following list describes the command choices:

EPT1	This choice is synonymous with EPTRIGGER1 and selects the PATTERN TRIG IN rear-panel connector.
EPT2	This choice is synonymous with EPTRIGGER2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.
EPTRIGGER1	This choice is synonymous with EPT1 and selects the PATTERN TRIG IN rear-panel connector.
EPTRIGGER2	This choice is synonymous with EPT2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.

***RST** EPT1

Key Entry **Patt Trig In 1** **Patt Trig In 2**

:WAVeform

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:WAVeform "WFM1:file_name"|"SEQ:file_name"
```

`[:SOURce]:RADio:ARB:WAVeform?`

This command selects a waveform file or sequence, for the dual ARB player to play. The file must be present in volatile memory, WFM1, or in the SEQ directory. If a file is in non-volatile memory (NVWFM), use the command ":COPY[:NAME]" on page 105 to copy the file to WFM1.

"WFM1:file_name" This variable names a waveform file residing in volatile memory (WFM1:). For information on the file name syntax, see "File Name Variables" on page 13.

"SEQ:file_name" This variable names a sequence file residing in the catalog of sequence files. For more information on the file name syntax, see "File Name Variables" on page 13.

Example

`:RAD:ARB:WAV "WFM1:Test_Data"`

The preceding example selects the file Test_Data from the list of files in volatile waveform memory, WFM1, and applies its file header settings.

Key Entry **Select Waveform**

:Waveform:NHEAders

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB:WAVeform:NHEaders "WFM1:file_name"|"SEQ:filename"
[:SOURce]:RADio:ARB:WAVeform:NHEaders?
```

This command, for the dual ARB mode, allows for a fast selection of a segment or sequence waveform file. No header information or settings are applied to the segment or sequence waveform file when this command is used. This will improve the access or loading speed of the waveform file to approximately 100 mS for a single segment. The file must be in volatile waveform memory (WFM1), or in the SEQ directory. If a file is in non-volatile waveform memory (NVWFM), use the command ":COPY[:NAME]" on page 105 to copy files to WFM1.

"WFM1:file_name" This variable names a waveform file residing in volatile memory:WFM1. For information on the file name syntax, see "File Name Variables" on page 13.

"SEQ:filename" This variable names a sequence file residing in the catalog of sequence files. For more information on the file name syntax, see "File Name Variables" on page 13.

Example

`:RAD:ARB:WAV:NHEA "Test_Data"`

The preceding example selects the file Test_Data, without applying header settings.

[:STATe]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ARB[:STATe] ON|OFF|1|0
[:SOURce]:RADio:ARB[:STATe]?
```

This command enables or disables the arbitrary waveform generator function.

***RST** 0

Key Entry **ARB Off On**

Multitone Subsystem–Option 001/601 or 002/602 ([:SOURce]:RADio:MTONe:ARB)

Creating a Multitone Waveform

Use the following steps to create a multitone waveform:

1. Initialize the phase for the multitone waveform. Refer to ":SETup:TABLe:PHASe:INITialize" on page 342.
2. Assign the frequency spacing between the tones. Refer to ":SETup:TABLe:FSPacing" on page 341.
3. Define the number of tones within the waveform. Refer to ":SETup:TABLe:NTONes" on page 341.
4. Modify the power level, phase, and state of any individual tones. Refer to ":ROW" on page 338.

:HEADer:CLEar

Supported E4438C with Option 001/601or 002/602

`[:SOURce]:RADio:MTONe:ARB:HEADer:CLEar`

This command clears the header information from the file header used by this modulation format.

Key Entry **Clear Header**

Remarks The **Multitone Off On** softkey must be set to On for this command to function.

:HEADer:SAVE

Supported E4438C with Option 001/601or 002/602

`[:SOURce]:RADio:MTONe:ARB:HEADer:SAVE`

This command saves the header information to the file header used by this modulation format.

Key Entry **Save Setup To Header**

Remarks The **Multitone Off On** softkey must be set to On for this command to function.

:IQ:EXTernal:FILTer

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:MTONe:ARB:IQ:EXTernal:FILTer 40e6|THRough
[:SOURce]:RADio:MTONe:ARB:IQ:EXTernal:FILTer?
```

This command selects the filter or through path for I/Q signals routed to the rear panel I and Q outputs. Selecting a filter using this command will automatically set ":IQ:EXTernal:FILTer:AUTO" on page 331 to OFF(0) mode.

40e6	This choice applies a 40 MHz baseband filter.
THRough	This choice bypasses filtering.
***RST**	THR
Key Entry	**40.000 MHz** **Through**

:IQ:EXTernal:FILTer:AUTO

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:MTONe:ARB:IQ:EXTernal:FILTer:AUTO ON|OFF|1|0
[:SOURce]:RADio:MTONe:ARB:IQ:EXTernal:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals routed to the rear panel I/Q outputs.

ON(1)	This choice will automatically select a digital modulation filter optimized for the current signal generator settings.
OFF(0)	This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to ":IQ:EXTernal:FILTer" on page 331 for selecting a filter or through path.
***RST**	1
Key Entry	**I/Q Output Filter Manual Auto**

:IQ:MODulation:ATTen

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:MTONe:ARB:IQ:MODulation:ATTen <val>
[:SOURce]:RADio:MTONe:ARB:IQ:MODulation:ATTen?
```

This command attenuates the I/Q signals being modulated through the signal generator RF path.

The variable <val> is expressed in units of decibels (dB).

***RST** +2.00000000E+000

Range 0–40

Key Entry **Modulator Atten Manual Auto**

:IQ:MODulation:ATTen:AUTO

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:MTONe:ARB:IQ:MODulation:ATTen:AUTO ON|OFF|1|0
[:SOURce]:RADio:MTONe:ARB:IQ:MODulation:ATTen:AUTO?
```

This command enables or disables the I/Q attenuation auto mode.

ON (1) This choice enables the attenuation auto mode which optimizes the modulator attenuation for the current conditions.

OFF (0) This choice holds the attenuator at its current setting or at a selected value. Refer to ":IQ:MODulation:ATTen" on page 332 for setting the attenuation value.

***RST** 1

Key Entry **Modulator Atten Manual Auto**

:IQ:MODulation:FILTer

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:MTONe:ARB:IQ:MODulation:FILTer 2.1e6|40e6|THRough
[:SOURce]:RADio:MTONe:ARB:IQ:MODulation:FILTer?
```

This command enables you to select a filter or through path for I/Q signals modulated onto the RF carrier. Selecting a filter using this command will automatically set ":IQ:MODulation:FILTer:AUTO" on page 333 to OFF(0) mode.

2.1E6 This choice applies a 2.1 MHz baseband filter to the I/Q signals.

40E6 This choice applies a 40 MHz baseband filter to the I/Q signals.

THRough This choice bypasses filtering.

***RST** THR

Key Entry **2.100 MHz** **40.000 MHz** **Through**

:IQ:MODulation:FILTer:AUTO

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:MTONe:ARB:IQ:MODulation:FILTer:AUTO ON|OFF|1|0
[:SOURce]:RADio:MTONe:ARB:IQ:MODulation:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals modulated onto the RF carrier.

ON(1) This choice will automatically select a digital modulation filter.

OFF(0) This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to ":IQ:MODulation:FILTer" on page 333 for selecting a filter or through path.

***RST** 1

Key Entry **I/Q Mod Filter Manual Auto**

:MDEStination:AAMPlitude

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:MTONe:ARB:MDEStination:AAMPlitude NONE|M1|M2|M3|M4
[:SOURce]:RADio:MTONe:ARB:MDEStination:AAMPlitude?
```

This command routes the selected marker to the Alternate Amplitude function. The `NONE` parameter clears the marker for the Alternate Amplitude function.

***RST**	NONE
Key Entry	**None** **Marker 1** **Marker 2** **Marker 3** **Marker 4**

:MDEStination:ALCHold

Supported E4438C with Option 001/601 or 002/602

CAUTION Incorrect automatic level control (ALC) sampling can create a sudden unleveled condition that may create a spike in the RF output potentially damaging a DUT or connected instrument. Ensure that you set markers to let the ALC sample over an amplitude that accounts for the high power levels within the signal.

```
[:SOURce]:RADio:MTONe:ARB:MDEStination:ALCHold NONE|M1|M2|M3|M4
[:SOURce]:RADio:MTONe:ARB:MDEStination:ALCHold?
```

This command enables or disables the marker ALC hold function for the selected marker. For setting markers, see ":MARKer:[SET]" on page 306.

Use the ALC hold function when you have a waveform signal that incorporates idle periods, or when the increased dynamic range encountered with RF blanking is not desired. The ALC leveling circuitry responds to the marker signal during the marker pulse (marker signal high), averaging the modulated signal level during this period.

The ALC hold function operates during the low periods of the marker signal. The marker polarity determines when the marker signal is high. For a positive polarity, this is during the marker points. For a negative polarity, this is when there are no marker points. For setting a marker's polarity, see ":MPOLarity:MARKer1|2|3|4" on page 337.

NOTE Do not use the ALC hold for more than 100 ms, because it can affect the waveform's output amplitude.

The marker signal has a minimum of a two-sample delay in its response relative to the waveform signal response. To compensate for the marker signal delay, offset marker points from the waveform sample point at which you want the ALC sampling to begin.

The ALC hold setting is part of the file header information, so saving the setting to the file header saves the current marker routing for the waveform file.

NOTE A waveform file that has unspecified settings in the file header uses the previous waveform's routing settings.

For more information on the marker ALC hold function, see the *E4428C/38C ESG Signal Generators User's Guide*. For setting the marker points, see ":MARKer:[SET]" on page 306.

NONE This terminates the marker ALC hold function.

M1–M4 These are the marker choices. The ALC hold feature uses only one marker at a time.

***RST** NONE

Example

`:RAD:AWGB:ARB:MDES:ALCH M1`

The preceding example routes marker 1 to the ALC Hold function.

Key Entry	**None**	**Marker 1**	**Marker 2**	**Marker 3**	**Marker 4**

Remarks N/A

:MDEStination:PULSe

Supported E4438C with Option 001/601or 002/602

CAUTION The pulse function incorporates ALC hold. Incorrect automatic level control (ALC) sampling can create a sudden unleveled condition that may create a spike in the RF output potentially damaging a DUT or connected instrument. Ensure that you set markers to let the ALC sample over an amplitude that accounts for the high power levels within the signal.

```
[:SOURce]:RADio:MTONe:ARB:MDEStination:PULSe NONE|M1|M2|M3|M4
[:SOURce]:RADio:MTONe:ARB:MDEStination:PULSe?
```

This command enables or disables the marker pulse/RF blanking function for the selected marker.

This function automatically incorporates the ALC hold function, so there is no need to select both the ALC hold and pulse/RF blanking functions for the same marker.

NOTE Do not use ALC hold for more than 100 ms, because it can affect the waveform's output amplitude.

The signal generator blanks the RF output when the marker signal goes low. The marker polarity determines when the marker signal is low. For a positive polarity, this is during the marker points. For a negative polarity, this is when there are no marker points. For setting a marker's polarity, see

“:MPOLarity:MARKer1|2|3|4” on page 337.

NOTE	Set marker points prior to using this function. Enabling this function without setting marker points may create a continuous low or high marker signal, depending on the marker polarity. This causes either no RF output or a continuous RF output. See “:MARKer:[SET]” on page 306 for setting the marker points.

The marker signal has a minimum of a two-sample delay in its response relative to the waveform signal response. To compensate for the marker signal delay, offset marker points from the waveform sample point at which you want the RF blanking to begin. The RF blanking setting is part of the file header information, so saving the setting to the file header saves the current marker routing for the waveform file.

NOTE	A waveform file that has unspecified settings in the file header uses the previous waveform’s routing settings. This could create the situation where there is no RF output signal, because the previous waveform used RF blanking.

For more information on the marker RF blanking function, see the *E4428C/38C ESG Signal Generators User’s Guide*.

NONE	This terminates the marker RF blanking/pulse function.
M1–M4	These are the marker choices. The RF blanking/pulse feature uses only one marker at a time.

Example

`:RAD:ARB:MDES:PULS M2`

The preceding example routes marker 2 to Pulse/RF Blanking.

***RST** NONE

Key Entry **None** **Marker 1** **Marker 2** **Marker 3** **Marker 4**

:MPOLarity:MARKer1|2|3|4

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:MTONe:ARB:MPOLarity:MARKer1|2|3|4 NEGative|POSitive
[:SOURce]:RADio:MTONe:ARB:MPOLarity:MARKer1|2|3|4?
```

This command sets the polarity for the selected marker. For a positive marker polarity, the marker signal is high during the marker points. For a negative marker polarity, the marker signal is high during the period of no marker points.

***RST** POS

Key Entry **Marker 1 Polarity Neg Pos** **Marker 2 Polarity Neg Pos** **Marker 3 Polarity Neg Pos**

Marker 4 Polarity Neg Pos

:REFerence:EXTernal:FREQuency

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:MTONe:ARB:REFerence:EXTernal:FREQuency <val>
[:SOURce]:RADio:MTONe:ARB:REFerence:EXTernal:FREQuency?
```

This command allows you to enter the frequency of the applied external reference.

The variable <val> is expressed in units of Hertz (Hz–MHz).

***RST** +1.00000000E+007

Range 2.5E5–1E8

Key Entry **Reference Freq**

Remarks The value specified by this command is effective only when you are using an external ARB reference applied to the BASEBAND GEN REF IN rear panel connector.

To specify external as the ARB reference source type, refer to ":REFerence[:SOURce]" on page 337.

:REFerence[:SOURce]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:MTONe:ARB:REFerence[:SOURce] INTernal|EXTernal
[:SOURce]:RADio:MTONe:ARB:REFerence[:SOURce]?
```

This command selects either an internal or external reference for the waveform clock.

***RST** INT

Key Entry ARB Reference Ext Int

Remarks If the EXTernal choice is selected, the external frequency *value must* be entered and the signal must be applied to the BASEBAND GEN REF IN rear panel connector.

Refer to ":REFerence:EXTernal:FREQuency" on page 337 to enter the external reference frequency.

:ROW

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:MTONe:ARB:SETup:TABLe:ROW <row_number>,<power>,
<phase>,<state>
[:SOURce]:RADio:MTONe:ARB:SETup:TABLe:ROW? <row_number>
```

This command modifies the indicated tone (row) of the multitone waveform.

<row_number> The number of rows for this variable are determined by the :SETup:TABLe command.

The variable <power> is expressed in units of decibels (dB).

The variable <phase> is expressed in units of degrees (deg).

Frequency offset, power, phase, and state value are returned when a query is initiated. The output format is as follows:

```
<frequency offset>,<power>,<phase>,<state>
```

***RST** *frequency offset*: –3.50000000E+004 *<power>*: +0.00000000E+000

<phase>: +0.00000000E+000 *<state>*: 1

Range *frequency offset*: –4E7 to 4E7 *<power>*: –80 to 0 *<phase>*: 0–359

<state>: 1

Key Entry **Goto Row** **Toggle State**

Remarks Refer to ":SETup:TABLe" on page 340 for information on how to change the number of rows.

This command is the final step in creating a multitone waveform. Refer to "Creating a Multitone Waveform" on page 330 for all four steps.

:RSCAling

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:MTONe:ARB:RSCaling <val>
[:SOURce]:RADio:MTONe:ARB:RSCaling?
```

This command adjusts the scaling value that is applied to the Multitone waveform while it is playing. The variable <val> is expressed as a percentage. Runtime scaling does not alter the waveform data file. For more information about runtime scaling, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

Example

`:RAD:MTON:ARB:RSC 50`

The preceding example applies a 50% scaling factor to the selected waveform.

***RST** +7.00000000E+001

Range 1–100

Key Entry **Waveform Runtime Scaling**

Remarks Runtime scaling does not alter the waveform data file.

:SCLock:RATE

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:MTONe:ARB:SCLock:RATE <val>
[:SOURce]:RADio:MTONe:ARB:SCLock:RATE?
```

This command sets the sample clock rate for the Multitone modulation format.

The variable <val> is expressed in units of hertz.

***RST** +1.00000000E+008

Range 1–1E8

Key Entry **ARB Sample Clock**

Remarks The modulation format should be active before executing this command. If this command is executed before the modulation format is active, the entered value will be overridden by a calculated factory default value. Refer to "[:STATe]" on page 343 to activate the modulation format.

:SETup

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:MTONe:ARB:SETup "<file name>"
[:SOURce]:RADio:MTONe:ARB:SETup?
```

This command retrieves a multitone waveform file.

Key Entry Load From Selected File

Remarks The name of a multitone waveform file is stored in the signal generator file system of MTONE files. This information is held in memory until you send the command that turns the waveform on.

Refer to “File Name Variables” on page 13 for information on the file name syntax.

:SETup:STORe

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:MTONe:ARB:SETup:STORe "<file name>"
```

This command stores the current multitone waveform setup in the signal generator file system of MTONE files.

Key Entry **Store To File**

:SETup:TABLe

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:MTONe:ARB:SETup:TABLe <freq_spacing>,
<num_tones>,{<phase>,<state>}
[:SOURce]:RADio:MTONe:ARB:SETup:TABLe?
```

This command creates and configures a multitone waveform.

The frequency offset, power, phase, and state value are returned when a query is initiated. The output format is as follows:

```
<frequency offset>,<power>,<phase>,<state>
```

The variable <freq_spacing> is expressed in units of Hertz (Hz–MHz).

The variable <power> is expressed in units of decibels (dB).

*RST	Tone	<frequency offset>	<power>	<phase>	<state>
	Tone 1	-35000	+0.00000000E+000	+0	+1
	Tone 2	-25000	+0.0000000E+000	+0	+1

***RST**

Tone	<frequency offset>	<power>	<phase>	<state>
Tone 3	-15000	+0.00000000E+000	+0	+1
Tone 4	-5000	+0.00000000E+000	+0	+1
Tone 5	+5000	+0.00000000E+000	+0	+1
Tone 6	+15000	+0.00000000E+000	+0	+1
Tone 7	+25000	+0.00000000E+000	+0	+1
Tone 8	+35000	+0.00000000E+000	+0	+1

Range *<freq_spacing>* (2 tones): 1E4–8E7 *<num_tones>*: 2–64

<freq_spacing> (>2 tones): 1E4 to (80 MHz ÷ (num_tones – 1))

<phase>: 0–359

Key Entry **Freq Spacing** **Number Of Tones** **Toggle State**

Remarks To set the frequency spacing, refer to “:SETup:TABLe:FSPacing” on page 341.

:SETup:TABLe:FSPacing

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:MTONe:ARB:SETup:TABLe:FSPacing <freq_spacing>
[:SOURce]:RADio:MTONe:ARB:SETup:TABLe:FSPacing?
```

This command sets the frequency spacing between the tones.

The variable <freq_spacing> is expressed in units of Hertz (Hz–MHz).

***RST** +1.00000000E+004

Range *<freq_spacing>* (2 tones): 1E4–8E7

<freq_spacing> (>2 tones): 1E4 to (80 MHz ÷ (num_tones – 1))

Key Entry **Freq Spacing**

Remarks To set frequency spacing and additional parameters required to create or configure a multitone waveform, refer to “:SETup:TABLe” on page 340.

This command is the second step in creating a multitone waveform. Refer to “Creating a Multitone Waveform” on page 330 for all four steps.

:SETup:TABLe:NTONes

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:MTONe:ARB:SETup:TABLe:NTONes <num_tones>
[:SOURce]:RADio:MTONe:ARB:SETup:TABLe:NTONes?
```

This command defines the number of tones in the multitone waveform.

***RST** +8

Range 2–64

Key Entry **Number Of Tones**

Remarks To specify the number of tones and additional parameters required to create or configure a multitone waveform, refer to ":SETup:TABLe" on page 340.

This command is the third step in creating a multitone waveform. Refer to "Creating a Multitone Waveform" on page 330 for all four steps.

:SETup:TABLe:PHASe:INITialize

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:MTONe:ARB:SETup:TABLe:PHASe:INITialize FIXed|RANDom
[:SOURce]:RADio:MTONe:ARB:SETup:TABLe:PHASe:INITialize?
```

This command initializes the phase in the multitone waveform table.

FIXed This choice sets the phase of all tones to the fixed value of 0 degrees.

RANDom This choice sets the phase of all tones to random values based on the setting on the random seed generator.

***RST** FIX

Key Entry **Initialize Phase Fixed Random**

Remarks To change the random number generator seed value, refer to ":SETup:TABLe:PHASe:INITialize:SEED" on page 342.

This command is the first step in creating a multitone waveform. Refer to "Creating a Multitone Waveform" on page 330 for all four steps.

:SETup:TABLe:PHASe:INITialize:SEED

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:MTONe:ARB:SETup:TABLe:PHASe:INITialize:SEED FIXed|RANDom
[:SOURce]:RADio:MTONe:ARB:SETup:TABLe:PHASe:INITialize:SEED?
```

This command initializes the random number generator seed that is used to generate the random phase values for the multitone waveform.

FIXed This choice sets the random number generator seed to a fixed value.

RANDom This choice sets the random number generator seed to a random value. This changes the phase value after each initialization of the phase.

***RST** FIX

Key Entry **Random Seed Fixed Random**

[:STATe]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:MTONe:ARB[:STATe] ON|OFF|1|0
[:SOURce]:RADio:MTONe:ARB[:STATe]?
```

This command enables or disables the multitone waveform generator function.

***RST** 0

Key Entry **Multitone Off On**

Wideband CDMA ARB Subsystem–Option 400 ([:SOURce]:RADio:WCDMa:TGPP:ARB)

:CLIPping:I

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:CLIPping:I <val>
[:SOURce]:RADio:WCDMa:TGPP:ARB:CLIPping:I?
```

This command limits the modulation level of the waveform’s I component to a percentage of full scale.

The variable <val> is expressed in units of percent.

***RST** +1.00000000E+002

Range 10–100

Key Entry **Clip |I| To**

:CLIPping:POSition

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:CLIPping:POSition PRE|POST
[:SOURce]:RADio:WCDMa:TGPP:ARB:CLIPping:POSition?
```

This command specifies whether a waveform is clipped before (PRE) or after (POST) FIR filtering.

***RST** PRE

Key Entry **Clip At PRE POST FIR Filter**

:CLIPping:Q

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:CLIPping:Q <val>
[:SOURce]:RADio:WCDMa:TGPP:ARB:CLIPping:Q?
```

This command limits the modulation level of the waveform’s Q component to a percentage of full scale.

The variable <val> is expressed in units of percent.

***RST** +1.00000000E+002

Range 10–100

Key Entry **Clip |Q| To**

:CLIPping:TYPE

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:CLIPping:TYPE IJQ|IORQ
[:SOURce]:RADio:WCDMa:TGPP:ARB:CLIPping:TYPE?
```

This command selects either IJQ or IORQ as the clipping type.

IJQ The combined I and Q waveform will be clipped (*circular* clipping).

IORQ The I and Q components of the waveform are clipped independently (*rectangular* clipping). I and Q can be clipped to different levels using this mode.

***RST** IJQ

Key Entry **Clipping Type |I+jQ| |I|,|Q|**

:CLIPping[:IJQ]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:CLIPping[:IJQ] <val>
[:SOURce]:RADio:WCDMa:TGPP:ARB:CLIPping[:IJQ]?
```

This command clips (limits) the modulation level of the combined I and Q waveform to a percentage of full scale.

The variable <val> is expressed in units of percent.

***RST** +1.00000000E+002

Range 10–100

Key Entry **Clip |I+jQ| To**

:CRATe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:CRATe <val>
[:SOURce]:RADio:WCDMa:TGPP:ARB:CRATe?
```

This command sets the chip rate value.

***RST**	+3.84000000E+006
Range	3456000–4224000
Key Entry	**Chip Rate**

:FILTer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:FILTer RNYQuist|NYQuist|GAUSsian|
RECTangle|WCDMA|AC4Fm|IS2000SR3DS|UGGaussian|"<user FIR>"
[:SOURce]:RADio:WCDMa:TGPP:ARB:FILTer?
```

This command selects the pre-modulation filter type.

WCDMA	This choice selects a 0.22 Nyquist filter optimized for ACP.
AC4Fm	This choice selects a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.
IS2000SR3DS	This choice selects an IS-2000 standard, spread rate 3 direct spread filter.
UGGaussian	This choice selects a backwards compatible GSM Gaussian filter (Gaussian filter with a fixed BbT value of 0.300) for the ESG E44xxB Option UN3 or UN4.
`"<user FIR>"`	This variable is any FIR filter file that you have stored in memory. The variable needs no directory path indicating the location of the file, such as `FIR:` or `/USER/FIR`. The command assumes the FIR directory. Refer to “File Name Variables” on page 13 for more information on file names.
***RST**	`NYQ`
Key Entry	**Root Nyquist** **Nyquist** **Gaussian** **Rectangle** **WCDMA** **APCO 25 C4FM** **IS-95** **UN3/4 GSM Gaussian** **IS-2000 SR3 DS** **User FIR**

:FILTer:ALPHa

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:FILTer:ALPHa <val>
[:SOURce]:RADio:WCDMa:TGPP:ARB:FILTer:ALPHa?
```

This command sets the alpha value for the Nyquist or root Nyquist filter.

The filter alpha value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +2.20000000E–001

Range 0.000–1.000

Key Entry **FiLter Alpha**

Remarks To change the current filter type, refer to “:FILTer” on page 346.

:FILTer:BBT

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:FILTer:BBT <val>
[:SOURce]:RADio:WCDMa:TGPP:ARB:FILTer:BBT?
```

This command changes the bandwidth-multiplied-by-bit-time (BbT) filter parameter.

The filter BbT value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +5.00000000E–001

Range 0.000–1.000

Key Entry **Filter BbT**

Remarks This command is effective only after choosing a Gaussian filter. It does not have an effect on other types of filters.

To change the current filter type, refer to “:FILTer” on page 346.

:FILTer:CHANnel

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:FILTer:CHANnel EVM|ACP
[:SOURce]:RADio:WCDMa:TGPP:ARB:FILTer:CHANnel?
```

This command optimizes the Nyquist and root Nyquist filters to minimize error vector magnitude (EVM) or to minimize adjacent channel power (ACP).

EVM This choice provides the most ideal passband.

ACP This choice improves stopband rejection.

***RST** ACP

Key Entry **Optimize FIR For EVM ACP**

Remarks To change the current filter type, refer to “:FILTer” on page 346.

:HEADer:CLEar

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:HEADer:CLEar
```

This command clears the header information from the file header used by this modulation format.

Key Entry **Clear Header**

Remarks The **W-CDMA Off On** softkey must be set to On for this command to function.

:HEADer:SAVE

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:HEADer:SAVE
```

This command saves the header information to the file header used by this modulation format.

Key Entry **Save Setup To Header**

Remarks The **W-CDMA Off On** softkey must be set to On for this command to function.

:IQ:EXTernal:FILTer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:IQ:EXTernal:FILTer 40e6|THRough
[:SOURce]:RADio:WCDMa:TGPP:ARB:IQ:EXTernal:FILTer?
```

This command selects the filter or through path for I/Q signals routed to the rear panel I and Q outputs. Selecting a filter using this command will automatically set “:IQ:EXTernal:FILTer:AUTO” on page 349 to OFF(0) mode.

40e6	This choice applies a 40 MHz baseband filter.
THRough	This choice bypasses filtering.
***RST**	THR
Key Entry	**40.000 MHz** **Through**

:IQ:EXTernal:FILTer:AUTO

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:IQ:EXTernal:FILTer:AUTO ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP:ARB:IQ:EXTernal:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals routed to the rear panel I/Q outputs.

ON(1)	This choice will automatically select a digital modulation filter optimized for the current signal generator settings.
OFF(0)	This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to “:IQ:EXTernal:FILTer” on page 348 for selecting a filter or through path.
***RST**	1
Key Entry	**I/Q Output Filter Manual Auto**

:IQMap

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:IQMap NORMal|INVert
[:SOURce]:RADio:WCDMa:TGPP:ARB:IQMap?
```

This command selects whether or not the I/Q outputs will be inverted.

NORMal	This choice selects normal polarity.
INVerted	This choice inverts the internal Q signal.
***RST**	NORM
Key Entry	**I/Q Mapping Normal Invert**

:IQ:MODulation:ATTen

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:IQ:MODulation:ATTen <val>
[:SOURce]:RADio:WCDMa:TGPP:ARB:IQ:MODulation:ATTen?
```

This command attenuates the I/Q signals being modulated through the signal generator RF path.

The variable <val> is expressed in units of decibels (dB).

***RST** +2.00000000E+00

Range 0–40

Key Entry **Modulator Atten Manual Auto**

:IQ:MODulation:ATTen:AUTO

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:IQ:MODulation:ATTen:AUTO ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP:ARB:IQ:MODulation:ATTen:AUTO?
```

This command enables or disables the I/Q attenuation auto mode.

ON (1) This choice enables the attenuation auto mode which optimizes the modulator attenuation for the current conditions.

OFF (0) This choice holds the attenuator at its current setting or at a selected value. Refer to ":IQ:MODulation:ATTen" on page 350 for setting the attenuation value.

***RST** 1

Key Entry **Modulator Atten Manual Auto**

:IQ:MODulation:FILTer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:IQ:MODulation:FILTer 2.1e6|40e6|THRough
[:SOURce]:RADio:WCDMa:TGPP:ARB:IQ:MODulation:FILTer?
```

This command enables you to select a filter or through path for I/Q signals modulated onto the RF carrier. Selecting a filter using this command will automatically set ":IQ:MODulation:FILTer:AUTO" on page 351 to OFF(0) mode.

2.1E6 This choice applies a 2.1 MHz baseband filter to the I/Q signals.

40E6 This choice applies a 40 MHz baseband filter to the I/Q signals.

THRough	This choice bypasses filtering.
***RST**	THR
Key Entry	**2.100 MHz** **40.000 MHz** **Through**

:IQ:MODulation:FILTer:AUTO

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:IQ:MODulation:FILTer:AUTO ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP:ARB:IQ:MODulation:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals modulated onto the RF carrier.

ON(1)	This choice will automatically select a digital modulation filter.
OFF(0)	This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to ":IQ:MODulation:FILTer" on page 350 for selecting a filter or through path.
***RST**	1
Key Entry	**I/Q Mod Filter Manual Auto**

:LINK

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK DOWN|UP
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK?
```

This command selects either a downlink or uplink channel configuration.

***RST**	DOWN
Key Entry	**Link Down Up**

:LINK:DOWN:OACP

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:OACP ADJ|ALT
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:OACP?
```

This command selects the channel power optimization type for any downlink channel W-CDMA setup.

ADJ	This choice optimizes for adjacent channel power.

ALT	This choice optimizes for alternate channel power.
***RST**	ADJ
Key Entry	**Optimize ACP ADJ ALT**
Remarks	This command is operational for any downlink channel W-CDMA setup.
	To change the current W-CDMA setup information, refer to ":LINK:DOWN:SETup" on page 352.

:LINK:DOWN:SETup

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup DPCH1|DPCH3|PPSCH|
PPDPCH1|PPDPCH3|TM1D16|TM1D32|TM1D64|TM2|TM3D16|TM3D32|TM4|TM5H2|TM5H4|
TM5H8|MCARrier|"<file name>"
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup?
```

This command selects a predefined channel setup or multicarrier, and turns multicarrier off or on (see the MCARrier choice description).

DPCH1	This choice selects 1 dedicated physical channel.
DPCH3	This choice selects 3 dedicated physical channels.
PPSCH	This choice selects a primary command control physical channel (PCCPCH) with a synchronization channel (SCH).
PPDPCH1	This choice selects a primary command control physical channel (PCCPCH) with a dedicated physical channel (DPCH).
PPDPCH3	This choice selects a primary command control physical channel (PCCPCH) with 3 dedicated physical channels.
TM1D16	This choice selects a Test Model 1 with 16 dedicated physical channels.
TM1D32	This choice selects a Test Model 1 with 32 dedicated physical channels.
TM1D64	This choice selects a Test Model 1 with 64 dedicated physical channels.
TM2	This choice selects a Test Model 2 downlink W-CDMA setup.
TM3D16	This choice selects a Test Model 3 with 16 dedicated physical channels.
TM3D32	This choice selects a Test Model 3 with 32 dedicated physical channels.
TM4	This choice selects a Test Model 4 downlink W-CDMA setup.
TM5H2	This choice selects a Test Model 5 with 6 DPCH and 2 HS-PDSCH (high speed physical shared channel) channels downlink W-CDMA setup.

TM5H4	This choice selects a Test Model 5 with 14 DPCH and 4 HS-PDSCH (high speed-physical downlink shared channel) channels downlink W-CDMA setup.
TM5H8	This choice selects a Test Model 5 with 30 DPCH and 8 HS-PDSCH (high speed physical shared channel) channels downlink WCDMA setup.
MCARrier	This choice selects multicarrier and turns it on. Selecting any other setup such as DPCH1 or TM1D16 turns multicarrrier off. To select the multicarrier setup, see ":LINK:DOWN:SETup:MCARrier".
`"<file name>"`	This choice selects a user-defined channel setup file. Refer to "File Name Variables" on page 13 for information on the file name syntax.
***RST**	DPCH1

Key Entry

1 DPCH	**3DPCH**	**PCCPCH + SCH**
PCCPCH + SCH + 1 DPCH	**PCCPCH + SCH + 3 DPCH**	**Test Model 1 w/ 16 DPCH**
Test Model 1 w/ 32 DPCH	**Test Model 1 w/ 64 DPCH**	**Test Model 2**
Test Model 3 w/ 16 DPCH	**Test Model 3 w/ 32 DPCH**	**Test Model 4**
Test Model 5 w/2HSPDSCH	**Test Model 5 w/4HSPDSCH**	
Test Model 5 w/ 8HSPDPCH	**Multicarrier Off On**	**Custom W-CDMA State**

:LINK:DOWN:SETup:MCARrier

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:MCARrier CAR2|CAR3|CAR4|
CAR4TM1D64|"<file name>"
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:MCARrier?
```

This command defines the type of multicarrier W-CDMA setup.

`CAR2` a standard 2-carrier setup with the following settings:

Carrier 1: PCCPCH + SCH, –7.5 MHz frequency offset, 0 dB power

Carrier 2: PCCPCH + SCH, 7.5 MHz frequency offset, 0 dB power

CAR3 a standard 3-carrier setup with the following settings:

Carrier 1: PCCPCH + SCH, –5 MHz frequency offset, 0 dB power

Carrier 2: PCCPCH + SCH, 0 kHz frequency offset, 0 dB power

Carrier 3: PCCPCH + SCH, 5 MHz frequency offset, 0 dB power

CAR4 a standard 4-carrier setup with the following settings:

Carrier 1: PCCPCH + SCH, –7.5 MHz frequency offset, 0 dB power

Carrier 2: PCCPCH + SCH, –2.5 MHz frequency offset, 0 dB power

Carrier 3: PCCPCH + SCH, 2.5 MHz frequency offset, 0 dB power

Carrier 4: PCCPCH + SCH, 7.5 MHz frequency offset, 0 dB power

CAR4TM1D64 a standard 4-carrier test model 1 with 64 dedicated physical channels setup with the following settings:

Carrier 1: Test Model 1 w/64 DPCH, –7.5 MHz frequency offset, 0 dB power

Carrier 2: Test Model 1 w/64 DPCH, –2.5 MHz frequency offset, 0 dB power

Carrier 3: Test Model 1 w/64 DPCH, 2.5 MHz frequency offset, 0 dB power

Carrier 4: Test Model 1 w/64 DPCH, 7.5 MHz frequency offset, 0 dB power

***RST** CAR2

Key Entry **2 Carriers** **3 Carriers** **4 Carriers**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:LINK:DOWN:SETup:MCARrier:CLIPping:I

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:MCARrier:CLIPping:I <val>
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:MCARrier:CLIPping:I?
```

This command limits the modulation level of the waveform's I component to a percentage of full scale.

The variable <val> is expressed in units of percent.

***RST** +1.00000000E+002

Range 10–100

Key Entry **Clip |I| To**

:LINK:DOWN:SETup:MCARrier:CLIPping:Q

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:MCARrier:CLIPping:Q <val>
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:MCARrier:CLIPping:Q?
```

This command limits the modulation level of the waveform's Q component to a percentage of full scale.

The variable <val> is expressed in units of percent.

***RST** +1.00000000E+002

Range 10–100

Key Entry **Clip |Q| To**

:LINK:DOWN:SETup:MCARrier:CLIPping:TYPE

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:MCARrier:CLIPping:
TYPE IJQ|IORQ
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:MCARrier:CLIPping:TYPE?
```

This command selects either IJQ or IORQ as the clipping type.

IJQ The combined I and Q waveform will be clipped (*circular* clipping).

IORQ The I and Q components of the waveform are clipped independently (*rectangular* clipping). I and Q can be clipped to different levels using this mode.

***RST** IJQ

Key Entry **Clipping Type |I+jQ| |I|,|Q|**

:LINK:DOWN:SETup:MCARrier:CLIPping[:IJQ]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:MCARrier:
CLIPping[:IJQ] <val>
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:MCARrier:CLIPping[:IJQ]?
```

This command clips (limits) the modulation level of the combined I and Q waveform to a percentage of full scale.

The variable <val> is expressed in units of percent.

***RST** +1.00000000E+002

Range 10–100

Key Entry **Clip |I+jQ| To**

:LINK:DOWN:SETup:MCARrier:SCODe:AINCrement

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:MCARrier:SCODe:AINCrement`

This command will sort carriers by frequency offset and auto-increment scramble codes starting from the current scramble code value for the lowest frequency carrier.

Key Entry **Increment Scramble Code**

Remarks If the lowest frequency carrier has a scramble code value of N/A, the auto-increment value will start at 0.

:LINK:DOWN:SETup:MCARrier:STORe

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:MCARrier:STORe "<file name>"`

This command stores the current multicarrier setup information.

The stored file contains information including the digital modulation format, number of carriers, frequency spacing, and power settings for the multicarrier setup.

Key Entry **Store Custom Multicarrier**

Remarks User defined files created using firmware prior to C.02.40 did not save the setting for Increment Scramble Code, Increment Timing Offset, and Clipping Type settings. When loading user defined files created with firmware prior to C.02.40, Increment Scramble Code and Increment Timing Offset will default to Off and the Clipping Type settings will default to 100%. Firmware C.02.40 will save the Increment Scramble Code, Increment Timing Offset and Clipping Type settings.

Refer to “File Name Variables” on page 13 for information on the file name syntax.

:LINK:DOWN:SETup:MCARrier:TABLe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:MCARrier:TABLe INIT|
APPend|<carrier_num>,DPCH1|DPCH3|PPSCH|PPDPCH1|PPDPCH3|TM1D16|TM1D32|
TM1D64|TM2|TM3D16|TM3D32|TM4|TM5H2|TM5H4|TM5H8|"<filename>",<freq_offset
>,<power>[,<scramble code>,<timing offset>,<initial phase>,
<pre-FIR circular clipping>[<clipping units {pct}|dB>],
<post-FIR circularclipping>[<clipping units {pct}|dB>]]
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:MCARrier:
TABLe? <carrier_num>
```

This command defines the multicarrier format and waveform.

Use INIT to clear the table and define the parameters for the first carrier; use APPend to add new channels. To edit an existing carrier, use its carrier number (`<carrier_num>`).

The variable <freq_offset> is expressed in units of Hertz (kHz–MHz).

The variable <power> is expressed in units of decibels (dB).

The carrier type, frequency offset, and power level are returned when a query is initiated. The output format is as follows:

`<carrier type>,<freq_offset>,<power>`

INIT	This choice clears the current information and creates a new one-row table, allowing for further definition using additional parameters.
APPend	This choice adds rows to an existing table. The maximum number of rows for one table is 16.
DPCH1	This choice selects 1 dedicated physical channel.
DPCH3	This choice selects 3 dedicated physical channels.
PPSCH	This choice selects a primary command control physical channel (PCCPCH) with a synchronization channel (SCH).
PPDPCH1	This choice selects a primary command control physical channel (PCCPCH) with a dedicated physical channel (DPCH).
PPDPCH3	This choice selects a primary command control physical channel (PCCPCH) with 3 dedicated physical channels.
TM1D16	This choice selects a test model 1 with 16 dedicated physical channels.
TM1D32	This choice selects a test model 1 with 32 dedicated physical channels.
TM1D64	This choice selects a test model 1 with 64 dedicated physical channels.

TM2	This choice selects a test model 2.
TM3D16	This choice selects a test model 3 with 16 dedicated physical channels.
TM3D32	This choice selects a test model 3 with 32 dedicated physical channels.
TM4	This choice selects a test model 4.
TM5H2	This choice selects a Test Model 5 with 6 DPCH and 2 HS-PDSCH (high speed physical shared channel) channels downlink W-CDMA setup.
TM5H4	This choice selects a Test Model 5 with 14 DPCH and 4 HS-PDSCH (high speed-physical downlink shared channel) channels downlink W-CDMA setup.
TM5H8	This choice selects a Test Model 5 with 30 DPCH and 8 HS-PDSCH (high speed physical shared channel) channels downlink W-CDMA setup.
<scramble code>	This variable sets the scramble code value.
<timing offset>	This variable sets the timing offset value.
<initial phase>	This variable sets the initial phase value. The units are not specified but the value represents degrees.
<clipping>	This variable sets the clipping value. If the units are not specified, the value will default to percent.
<carrier_num>	This variable specifies the number of multicarriers.

***RST** *carrier type*: PPSCH *<freq_offset>*: +7.50000000E+006

<power>: +0.00000000E+000

Range *<freq_offset>*: –37.5E6 to 37.5E6 *<power>*: –40 to 0

scramble code: 0–511 *timing offset*: 0–149 initial phase: 0–359

clipping(in units of percent): 0.0–100.0 or 0.0 to –20.0 (if units are dB)

Key Entry **1 DPCH** **3 DPCH** **PCCPCH + SCH** **PCCPCH + SCH + 1 DPCH**

PCCPCH + SCH + 3 DPCH **Test Model 1 w/ 16 DPCH**

Test Model 1 w/ 32 DPCH **Test Model 1 w/ 64 DPCH** **Test Model 2**

Test Model 3 w/ 16 DPCH **Test Model 3 w/ 32 DPCH** **Test Model 4**

Test Model 5 w/2HSPDSCH **Test Model 5 w/4HSPDSCH**

Test Model 5 w/8HSPDSCH

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to

":LINK:DOWN:SETup:TABLe:APPLy" on page 361.

:LINK:DOWN:SETup:MCARrier:TABLe:NCARriers

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:MCARrier:TABLe:NCARriers?`

This command queries the number of carriers specified for the W-CDMA multicarrier waveform.

***RST** +2

:LINK:DOWN:SETup:MCARrier:TOFFset:AINCrement

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:MCARrier:TOFFset:`
`AINCrement`

This command will sort carriers by frequency offset and auto-increment timing offsets. The new values will start with the current timing offset for the lowest frequency carrier and increment by one for each subsequent carrier.

Key Entry **Increment Timing Offset**

:LINK:DOWN:SETup:STORe

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:STORe "<file name>"`

This command stores the current downlink setup information into the memory catalog with the entered file name.

Along with the contents of the W-CDMA channel table editor (channel types, Walsh code, power levels, PN offset, and data), this command stores the following information to the signal generator memory:

FIR filter
FIR filter file name
FIR filter alpha
FIR filter BbT
FIR filter channel (EVM or ACP)
I/Q mapping
increment scramble code
increment timing offset
link
spread type

spread rate
ARB reference clock source (internal or external)
ARB reference clock frequency
clipping
multicarrier spacing
radio configuration

Key Entry **Store Custom W-CDMA State**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:LINK:DOWN:SETup:TABLe:APPLy

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:TABLe:APPLy
```

This command generates a W-CDMA signal based on the current values in the W-CDMA channel setup table editor.

Key Entry **Apply Channel Setup**

:LINK:DOWN:SETup:TABLe:CHANnel

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:TABLe:CHANnel INIT|
APPend|<chan_num>,<chan_type>,<symbol_rate>,<spread_code>,<power>,
<timing_offset>,<TFCI>,<TPC>,<scramble_code>,STANdard|RALTernate|
LALTernate,<scramble_offset>,RANDom|PN9|PINDicator|
<data_val>,<TFCI_power>,<TPC_power>,<pilot_power>,<pilot_bits>
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:TABLe:CHANnel? <chan_num>
```

This command sets up the W-CDMA downlink channel type parameters.

Use INIT to clear the table editor and define the parameters for the first channel; use APPend to add new channels. To edit an existing channel, use its channel number <chan_num>.

The <power>, <TFCI_power>, <TPC_power>, and <pilot_power> variables are expressed in units of decibels (dB).

The channel type, symbol rate, spread code, power, timing offset, TFCI value, TPC value, scramble code, scramble type, scramble offset, data type, TFCI power, TPC power, pilot power, and the number of pilot bits are returned when a query is initiated. The output format is as follows:

```
<chan_type>,<symbol_rate>,<spread_code>,<power>,<tDPCH_offset>,<TFCI>,
<TPC>,<scramble_code>,<scramble_type>,<scramble_code>,<scramble_offset>,
```

```
<data_type>,<TFCI_power>,<TPC_power>,<pilot_power>,<pilot_bits>
```

INIT	This choice clears the current information and creates a new one-row table, allowing for further definition using additional parameters.
APPend	This choice adds a row to an existing table.
<chan_num>	This variable sets the physical channel number.
<chan_type>	This variable sets the channel type.
<timing_offset>	This variable sets the symbol offset.
<TFCI>	This variable sets the transport format combination indicator.
<TPC>	This variable sets the transmit power control.
STANdard	This choice sets the scramble type to standard.
RALTernate	This choice sets the scramble type to right alternate.
LALTernate	This choice sets the scramble type to left alternate.
RANDom	This choice sets a randomly generated pseudo-random sequence pattern as output data.
PN9	This choice sets an internally generated 9-bit pseudo-random sequence pattern as output data.
PINDicator	This choice sets the paging indicator channel (PICH).
<data_val>	This variable sets the data value.
<TFCI_power>	This variable sets the transport format combination indicator power offset.
<TPC_power>	This variable sets the transport power control power offset.
<pilot_power>	This variable sets the pilot power offset.
<pilot_bits>	This variable sets the number of pilot bits that will be in the dedicated physical channel (DPCH).

Table 5-1 Variables and Channel Types

	SSCH	CPICH	PCCPCH	SCCPCH	PICH	DPCH	OCNS	PSCH
Channel number	X	X	X	X	X	X	X	X
Symbol rate	N/A	N/A	N/A	X	N/A	X	X	N/A

Table 5-1 Variables and Channel Types

	SSC H	CPIC H	PCCPC H	SCCPC H	PIC H	DPC H	OCN S	PSC H
Spread code	N/A	X	X	X	X	X	X	N/A
Power	X	X	X	X	X	X	X	X
Symbol offset	N/A	N/A	N/A	N/A	X	X	N/A	N/A
TFCI	N/A	N/A	N/A	X	N/A	X	N/A	N/A
TPC	N/A	N/A	N/A	N/A	N/A	X	N/A	N/A
Scramble code	X	X	X	X	X	X	X	N/A
Standard	X	X	X	N/A	X	X	X	N/A
Right alternate	X	X	X	N/A	X	X	X	N/A
Left alternate	X	X	X	N/A	X	X	X	N/A
Scramble offset	X	X	X	X	X	X	X	N/A
Random	N/A	N/A	X	X	X	X	X	N/A
PN9	N/A	N/A	X	X	X	X	X	N/A
Paging Indicator	N/A	N/A	N/A	N/A	X	N/A	N/A	N/A
Data value	N/A	N/A	X	N/A	X	X	X	N/A
TFCI power	N/A	N/A	N/A	N/A	X	N/A	N/A	N/A
Pilot power offset	N/A	N/A	N/A	N/A	X	N/A	N/A	N/A
Pilot bits	N/A	N/A	N/A	X	X	N/A	N/A	N/A

Table 5-2 Variables and Channel Types

	HSPDSCH	HSSCCH
Channel number	X	X
Symbol rate	N/A (fixed to 30ksps)	N/A (fixed to 240ksps)

Table 5-2 Variables and Channel Types

	HSPDSCH	HSSCCH
Spread code	X	X
Power	X	X
Symbol offset	X	X
TFCI	N/A	N/A
TPC	N/A	N/A
Scramble code	X	X
Standard	X	X
Right alternate	X	X
Left alternate	X	X
Scramble offset	X	X
Random	X	X
PN9	X	X
Paging Indicator	N/A	N/A
Data value	X	X
TFCI power	N/A	N/A
Pilot power offset	N/A	N/A
Pilot bits	N/A	N/A

***RST** <chan_type>: DPCH <symbol_rate>: +3.00000000E+004
<spread_code>: +8 <scramble_offset>: +0.00000000E+000
power: +0.00000000E+000 <tDPCH_offset>: +0 <TFCI>: +0
<TPC>: #H5555 <scramble_code>: +0 scramble type: STAN
<TFCI_power>: +0.00000000E+000
<TPC_power>: +0.00000000E+000 <pilot_power>: +0.00000000E+000
<pilot_bits>: +4

Range

<chan_type>: PSCH SSCH CPICh PCCPch SCCPch DPCH PICH OCNS HSSCch HSPDsch

<power>: –40 to 0 <tDPCH_offset>: 0–149 <TFCI>: 0–1023

<TPC>: 0000–7FFF <scramble_code>: 0–511

<scramble_offset>: 0–15 <data_val>: 00000000–11111111

<TFCI_power>: –20 to 20 <TPC_power>: –20 to 20

<pilot_power>: 0000–7FFF <pilot_bits>: 0–511

SCCPCH Channel

<*symbol_rate*>	**<spread_code>**	***<pilot_bits>**
15 ksps	0–256	0,8
30 ksps	0–128	0,8
60 ksps	0–64	0,8
120 ksps	0–32	0,8
240 ksps	0–16	0,16
480 ksps	0–8	0,16
960 ksps	0–4	0,16

All Other Channels

<*symbol_rate*>	**<spread_code>**	**<pilot_bits>**
7.5 ksps	0–511	4
15 ksps	0–255	2,4,8
30 ksps	0–127	4,8
60 ksps	0–63	8
120 ksps	0–31	8
240 ksps	0–15	16
480 ksps	0–7	16
960 ksps	0–3	16

Key Entry

Channel **Type** **Symbol Rate** **First Spread Code** **Power**

Spread Code **TFCI Field Off On** **Scramble Code** **Scramble Offset**

Random **PN9** **Standard** **Left Alternate** **Right Alternate**

PCCPCH **SCCPCH** **PSCH** **SSCH** **CPICH** **DPCH** **PICH** **OCNS**

HSPDSCH **HSSCCH**

Field Entry

`Spread Code` `Power` `Timing Offset` `TFCI` `Scramble Code`

`TFCI Power` `TPC Power` `Pilot Power` `Pilot Bits` `Data`

`Scramble Type` `Scramble Offset`

Remarks For additional information, refer to the 3GPP TS 25.211 (V 3.7) standard.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":LINK:DOWN:SETup:TABLe:APPLy" on page 361.

:LINK:DOWN:SETup:TABLe:NCHannels?

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:TABLe:NCHannel?
```

This command queries the number of channels being used for the carrier.

***RST** 1

:LINK:DOWN:SETup:TABLe:PADJust

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:TABLe:PADJust` EQUal|SCALe

This command sets the code domain power.

EQUal This choice will adjust all channel powers to have equal energy per symbol, referenced to 7.5 ksps and increasing by 3 dB for each doubling of the symbol rate.

SCALe This choice will scale the channel power levels so that the sum of the powers are equal to 0 dB.

Key Entry **Equal Energy per Symbol** **Scale To 0dB**

Remarks This command is available in downlink only.

:LINK:DOWN:TFCI

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:TFCI ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:TFCI?
```

This command enables or disables the transport format combination indicator (TFCI) field for all channels.

***RST** 1

Key Entry **TCFI Field Off On**

:LINK:UP:OACP

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:UP:OACP ADJ|ALT
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:UP:OACP?
```

This command selects the channel power optimization type for any uplink channel W-CDMA setup.

ADJ This choice optimizes for adjacent channel power.

ALT This choice optimizes for alternate channel power.

***RST** ADJ

Key Entry **Optimize ACP ADJ ALT**

Remarks This command is only operational for any uplink channel W-CDMA setup.

To change the current W-CDMA setup information, refer to ":LINK:UP:SETup" on page 368.

:LINK:UP:SCRAMBLE

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:UP:SCRAMBLE <val>
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:UP:SCRAMBLE?
```

This command sets the scramble code for the uplink.

***RST** #H000000

Range #H0–FFFFFFF

Key Entry **Scramble Code**

:LINK:UP:SDPDch

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:UP:SDPDch I|Q
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:UP:SDPDch?
```

This command selects whether the second dedicated physical data channel (SDPDCH) will be put onto I or Q.

***RST** Q

Key Entry **Second DPDCH I Q**

:LINK:UP:SETup

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:UP:SETup` DPCCH|DDPDCH1|DDPDCH2|DDPDCH3|DDPDCH4|DDPDCH5|`"<file name>"`
`[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:UP:SETup?`

This command selects a dedicated physical control channel (DPCCH) for uplink with the option to add one or more dedicated physical data channel (DPDCH) or a previously stored setup.

DPCCH This choice selects 1 dedicated physical control channel.

DDPDCH1 This choice selects 1 dedicated physical control channel and 1 dedicated physical data channel.

DDPDCH2 This choice selects 1 dedicated physical control channel and 2 dedicated physical data channel.

DDPDCH3 This choice selects 1 dedicated physical control channel and 3 dedicated physical data channel.

DDPDCH4 This choice selects 1 dedicated physical control channel and 4 dedicated physical data channel.

DDPDCH5 This choice selects 1 dedicated physical control channel and 5 dedicated physical data channel.

***RST** DPCCH

Key Entry **DPCCH** **DPCCH + 1 DPDCH** **DPCCH + 2 DPDCH** **DPCCH + 3 DPDCH** **DPCCH + 4 DPDCH** **DPCCH + 5 DPDCH** **Custom WCDMA State**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":LINK:UP:SETup:TABLe:APPLy" on page 369.

:LINK:UP:SETup:STORe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:UP:SETup:STORe "<file name>"
```

This command stores the current state into a designated file name.

Key Entry **Store To File**

Remarks You can recall a saved state from signal generator memory (non-volatile) by executing the following commands (using a designated file name):

For downlink, refer to ":LINK:DOWN:SETup" on page 352.

For uplink, refer to ":LINK:UP:SETup" on page 368.

Refer to "File Name Variables" on page 13 for information on the file name syntax.

:LINK:UP:SETup:TABLe:APPLy

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:UP:SETup:TABLe:APPLy
```

This command applies the signal based on the current values in the W-CDMA channel setup table editor.

Key Entry **Apply Channel Setup**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:LINK:UP:SETup:TABLe:CHANnel

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:UP:SETup:TABLe:CHANnel
INIT|APPend|<chan_num>,<chan_type>,<symbol_rate>,<spread_code>,<power>,
<TFCI>,<TCP>,RANDom|<data_val>,<fbi_bits_count>,<fbi_bits_value>
[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:UP:SETup:TABLe:CHANnel? <chan_num>
```

This command defines the channel parameters of the signal.

Use INIT to clear the table editor and define the parameters for the first channel; use APPend to add new channels. To edit an existing channel, use its channel number `<chan_num>`.

The variable `<power>` is expressed in units of decibels (dB).

The channel type, symbol rate, spread code, power, TFCI value, TPC value, data value, FBI bit count, and FBI bit value are returned when a query is initiated. The output format is as follows:

`<chan_type>,<symbol_rate>,<spread_code>,<power>,<TFCI>,<TCP>,<data_val>,`
`<fbi_bits_count>,<fbi_bits_value>`

`INIT` This choice clears the current information and creates a new one-row table, allowing for further definition using additional parameters.

`APPend` This choice adds a row to an existing table.

`RANDom` This choice selects random data format for the digital modulation signal.

`<fbi_bits_count>` This variable sets the number of feedback information (FBI) bits.

`<fbi_bits_value>` This variable sets the value of the FBI bits.

***RST** <chan_type>: DPCH <symbol_rate>: +1.50000000E+

<spread_code>: +0 <power>: +0.00000000E+000 <TFCI>: +0

<TPC>: #H5555 <data_val>: RAND <FBI Bits Count: +0

<FBI Bit Count: +0

Range <power>: –40 to 0 <data_val>: 00000000–11111111

<fbi_bits_count>: 0–2 <fbi_bits_value>: 0–3

<symbol_rate>	**<spread_rate>**
7.5 ksps	0–511
15 ksps	0–255
30 ksps	0–127
60 ksps	0–63
120 ksps	0–31
240 ksps	0–15
480 ksps	0–7
960 ksps	0–3

Key Entry **Channel** **Type** **Symbol Rate** **First Spread Code** **Power**

Spread Code **TFCI Field Off On** **Scramble Code** **Scramble Offset**

Random

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":LINK:UP:SETup:TABLe:APPLy" on page 369.

:LINK:UP:SETup:TABLe:GUNit

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:UP:SETup:TABLe:GUNit` DB|LINear|INDex
`[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:UP:SETup:TABLe:GUNit?`

This command selects the uplink power measurement units.

DB The power is set in decibels-exponential.

LINear The power is set to increase linearly.

INDex The power is set at an index level - steps.

***RST** DB

Key Entry **Gain Unit dB Lin Index**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:LINK:UP:SETup:TABLe:APPLy” on page 369.

:LINK:UP:SETup:TABLe:NCHannel

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:UP:SETup:TABLe:NCHannels?`

This command queries the setup table for the number of uplink channels.

***RST** 1

:LINK:UP:TFCI

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:UP:TFCI ON|OFF|1|0`
`[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:UP:TFCI?`

This command enables or disables the transport format combination indicator (TFCI) field for all channels in the table.

***RST** 1

Key Entry **TCFI Field Off On**

:MDEStination:AAMPlitude

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:MDEStination:AAMPlitude NONE|M1|M2|M3|M4
[:SOURce]:RADio:WCDMa:TGPP:ARB:MDEStination:AAMPlitude?
```

This command routes the selected marker to the Alternate Amplitude function. The `NONE` parameter clears the marker to the Alternate Amplitude function.

***RST** NONE

Key Entry **None** **Marker 1** **Marker 2** **Marker 3** **Marker 4**

:MDEStination:ALCHold

Supported E4438C with Option 400

CAUTION Incorrect automatic level control (ALC) sampling can create a sudden unleveled condition that may create a spike in the RF output potentially damaging a DUT or connected instrument. Ensure that you set markers to let the ALC sample over an amplitude that accounts for the high power levels within the signal.

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:MDEStination:ALCHold NONE|M1|M2|M3|M4
[:SOURce]:RADio:WCDMa:TGPP:ARB:MDEStination:ALCHold?
```

This command enables or disables the marker ALC hold function for the selected marker. For setting markers, see ":MARKer:[SET]" on page 306.

Use the ALC hold function when you have a waveform signal that incorporates idle periods, or when the increased dynamic range encountered with RF blanking is not desired. The ALC leveling circuitry responds to the marker signal during the marker pulse (marker signal high), averaging the modulated signal level during this period.

The ALC hold function operates during the low periods of the marker signal. The marker polarity determines when the marker signal is high. For a positive polarity, this is during the marker points. For a negative polarity, this is when there are no marker points. For setting a marker's polarity, see ":MPOLarity:MARKer1|2|3|4" on page 375.

NOTE Do not use the ALC hold for more than 100 ms, because it can affect the waveform's output amplitude.

The marker signal has a minimum of a two-sample delay in its response relative to the waveform signal response. To compensate for the marker signal delay, offset marker points from the waveform sample point at which you want the ALC sampling to begin.

The ALC hold setting is part of the file header information, so saving the setting to the file header saves the current marker routing for the waveform file.

NOTE	A waveform file that has unspecified settings in the file header uses the previous waveform's routing settings.

For more information on the marker ALC hold function, see the *E4428C/38C ESG Signal Generators User's Guide*. For setting the marker points, see ":MARKer:[SET]" on page 306.

NONE This terminates the marker ALC hold function.

M1–M4 These are the marker choices. The ALC hold feature uses only one marker at a time.

***RST** NONE

Example

```
:RAD:AWGB:ARB:MDES:ALCH M1
```

The preceding example routes marker 1 to the ALC Hold function.

Key Entry	**None**	**Marker 1**	**Marker 2**	**Marker 3**	**Marker 4**

Remarks N/A

:MDEStination:PULSe

Supported E4438C with Option 400

CAUTION	The pulse function uses the ALC hold. Incorrect automatic level control (ALC) sampling can create a sudden unleveled condition that may create a spike in the RF output potentially damaging a DUT or connected instrument. Ensure that you set markers to let the ALC sample over an amplitude that accounts for the high power levels within the signal.

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:MDEStination:PULSe NONE|M1|M2|M3|M4
[:SOURce]:RADio:WCDMa:TGPP:ARB:MDEStination:PULSe?
```

This command enables or disables the marker pulse/RF blanking function for the selected marker.

This function automatically uses the ALC hold function, so there is no need to select both the ALC hold and the pulse/RF blanking for the same marker.

NOTE	Do not use ALC hold for more than 100 ms, because it can affect the waveform's output amplitude.

The signal generator blanks the RF output when the marker signal goes low. The marker polarity determines when the marker signal is low. For a positive polarity, this is during the marker points. For a negative polarity, this is when there are no marker points. For setting a marker's polarity, see ":MPOLarity:MARKer1|2|3|4" on page 375.

NOTE	Set marker points prior to using this function. Enabling this function without setting marker points may create a continuous low or high marker signal, depending on the marker polarity. This causes either no RF output or a continuous RF output. See ":MARKer:[SET]" on page 306 for setting the marker points.

The marker signal has a minimum of a two-sample delay in its response relative to the waveform signal response. To compensate for the marker signal delay, offset marker points from the waveform sample point at which you want the RF blanking to begin. The RF blanking setting is part of the file header information, so saving the setting to the file header saves the current marker routing for the waveform file.

NOTE	A waveform file that has unspecified settings in the file header uses the previous waveform's routing settings. This could create the situation where there is no RF output signal, because the previous waveform used RF blanking.

For more information on the marker RF blanking function, see the *E4428C/38C ESG Signal Generators User's Guide*.

NONE	This terminates the marker RF blanking/pulse function.
M1–M4	These are the marker choices. The RF blanking/pulse feature uses only one marker at a time.

Example

```
:RAD:ARB:MDES:PULS M2
```

The preceding example routes marker 2 to Pulse/RF Blanking.

***RST** NONE

Key Entry **None** **Marker 1** **Marker 2** **Marker 3** **Marker 4**

:MPOLarity:MARKer1|2|3|4

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:MPOLarity:MARKer1|2|3|4 NEGative|POSitive
[:SOURce]:RADio:WCDMa:TGPP:ARB:MPOLarity:MARKer1|2|3|4?
```

This command sets the polarity for the selected marker. For a positive marker polarity, the marker signal is high during the marker points. For a negative marker polarity, the marker signal is high during the period of no marker points.

***RST** POS

Key Entry **Marker 1 Polarity Neg Pos** **Marker 2 Polarity Neg Pos** **Marker 3 Polarity Neg Pos**

Marker 4 Polarity Neg Pos

:REFerence:EXTernal:FREQuency

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:REFerence:EXTernal:FREQuency <val>
[:SOURce]:RADio:WCDMa:TGPP:ARB:REFerence:EXTernal:FREQuency?
```

This command sets the external reference frequency.

The variable <val> is expressed in hertz (Hz).

***RST** +1.00000000E+007

Range 2.5E5–1E8

Remarks The value specified by this command is effective only when you are using an external ARB reference applied to the BASEBAND GEN REF IN rear panel connector.

To specify external as the ARB reference source type, refer to “:REFerence[:SOURce]” on page 375.

:REFerence[:SOURce]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:REFerence[:SOURce] INTernal|EXTernal
[:SOURce]:RADio:WCDMa:TGPP:ARB:REFerence[:SOURce]?
```

This command selects either an internal or external reference for the waveform clock.

***RST** 0

Key Entry **ARB Reference Ext Int**

Remarks If the EXTernal choice is selected, the external frequency value *must* be entered and the signal must be applied to the BASEBAND GEN REF IN rear panel connector.

Refer to ":REFerence:EXTernal:FREQuency" on page 375 to enter the external reference frequency.

:RETRigger

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:RETRigger ON|OFF|IMMediate
[:SOURce]:RADio:WCDMa:TGPP:ARB:RETRigger?
```

This command sets the retrigger mode.

ON This choice specifies that if a trigger occurs while a waveform is initiated, the waveform will retrigger at the end of the previous waveform sequence and play once more.

OFF This choice specifies that if a trigger occurs while a waveform is initiated, the action will be ignored.

IMMediate This choice specifies that if a trigger occurs while a waveform is playing, the waveform will reset and replay from the start immediately upon receiving a trigger.

***RST** 0

Key Entry **Retrigger Mode Off On**

:REVision

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:REVision?
```

This command checks the 3GPP supported standard for the arbitrary waveform generator firmware.

:SCLock:RATE

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:SCLock:RATE <val>
[:SOURce]:RADio:WCDMa:TGPP:ARB:SCLock:RATE?
```

This command sets the sample clock rate for the W-CDMA modulation format.

The variable <val> is expressed in units of hertz.

***RST** +1.00000000E+008

Range 1–1E8

Key Entry **ARB Sample Clock**

Remarks The modulation format should be active before executing this command. If this command is executed before the modulation format is active, the entered value will be overridden by a calculated factory default value. Refer to “[:STATe]” on page 383 to activate the modulation format.

:TRIGger:TYPE

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:TRIGger:TYPE CONTinuous|SINGLE|GATE
[:SOURce]:RADio:WCDMa:TGPP:ARB:TRIGger:TYPE?
```

This command sets the trigger mode (type) that controls the waveform’s playback.

Triggers control the playback by telling the ESG when to play the modulating signal (waveform). Depending on the trigger settings for the ESG, the waveform playback can occur once, continuously, or the ESG may start and stop playing the waveform repeatedly (GATE mode).

A trigger signal comprises both positive and negative signal transitions (states), which are also called high and low periods. You can configure the ESG to trigger on either state of the trigger signal. It is common to have multiple triggers, also referred to as trigger occurrences or events, occur when the signal generator requires only a single trigger. In this situation, the ESG recognizes the first trigger and ignores the rest.

When you select a trigger mode, you may lose the signal (carrier plus modulating) from the RF output until you trigger the waveform. This is because the ESG sets the I and Q signals to zero volts prior to the first trigger event, which suppresses the carrier. After the first trigger event, the waveform’s final I and Q levels determine whether you will see the carrier signal or not (zero = no carrier, other values = carrier visible). At the end of most files, the final I and Q points are set to a value other than zero.

There are four parts to configuring the trigger:

- Choosing the trigger type, which controls the waveform's transmission.
- Setting the waveform's response to triggers:
  - — CONTinuous, see ":TRIGger:TYPE:CONTinuous[:TYPE]" on page 379
  - — SINGle, see ":RETRigger" on page 376
  - — GATE, selecting the mode also sets the response
- Selecting the trigger source (see ":TRIGger[:SOURce]" on page 380), which determines how the ESG receives its trigger signal, internally or externally. The GATE choice requires an external trigger.
- Setting the trigger polarity when using an external source:
  - — CONTinuous and SINGle see ":TRIGger[:SOURce]:EXTernal:SLOPe" on page 382
  - — GATE, see ":TRIGger:TYPE:GATE:ACTive" on page 379

For more information on triggering, see the *E4428C/38C ESG Signal Generators User's Guide*.

The following list describes the trigger type command choices:

CONTinuous	Upon triggering, the waveform repeats continuously.
SINGle	Upon triggering, the waveform segment or sequence plays once.
GATE	An external trigger signal repeatedly starts and stops the waveform's playback (transmission). The time duration for playback depends on the duty period of the trigger signal and the gate polarity selection (see ":TRIGger:TYPE:GATE:ACTive" on page 379). The waveform plays during the inactive state and stops during the active polarity selection state. The active state can be set high or low. The gate mode works only with an external trigger source.

NOTE The ARB gating behavior described above is opposite to the gating behavior for real-time custom mode.

***RST** CONT

Key Entry **Continuous** **Single** **Gated**

:TRIGger:TYPE:CONTinuous[:TYPE]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:TRIGger:CONTinuous[:TYPE] FREE|
TRIGger|RESet
[:SOURce]:RADio:WCDMa:TGPP:ARB:TRIGger:CONTinuous[:TYPE]?
```

This commands selects the waveform's response to a trigger signal while using the continuous trigger mode.

For more information on triggering and to select the continuous trigger mode, see ":TRIGger:TYPE" on page 377.

The following list describes the waveform's response to each of the command choices:

FREE Turning the ARB format on immediately triggers the waveform. The waveform repeats until you turn the format off, select another trigger, or choose another waveform file.

TRIGger The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously until you turn the format off, select another trigger, or choose another waveform file.

RESet The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously. Subsequent triggers reset the waveform to the beginning. For a waveform sequence, this means to the beginning of the first segment in the sequence.

***RST** FREE

Key Entry **Free Run** **Trigger & Run** **Reset & Run**

:TRIGger:TYPE:GATE:ACTive

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:TRIGger:TYPE:GATE:ACTive LOW|HIGH
[:SOURce]:RADio:WCDMa:TGPP:ARB:TRIGger:TYPE:GATE:ACTive?
```

This command selects the active state (gate polarity) of the gate while using the gating trigger mode.

The LOW and HIGH selections correspond to the low and high states of an external trigger signal. For example, when you select HIGH, the active state occurs during the high of the trigger signal. When the active state occurs, the ESG stops the waveform playback at the last played sample point, then restarts the playback at the next sample point when the inactive state occurs. For more information on triggering and to select gating as the trigger mode, see ":TRIGger:TYPE" on page 377.

The following list describes the ESG's gating behavior for the polarity selections:

LOW	The waveform playback stops when the trigger signal goes low (active state) and restarts when the trigger signal goes high (inactive state).
HIGH	The waveform playback stops when the trigger signal goes high (active state) and restarts when the trigger signal goes low (inactive state).
***RST**	HIGH
Key Entry	Gate Active Low High

:TRIGger[:SOURce]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:TRIGger[:SOURce] KEY|EXT|BUS
[:SOURce]:RADio:WCDMa:TGPP:ARB:TRIGger[:SOURce]?
```

This command sets the trigger source.

For more information on triggering, see “:TRIGger:TYPE” on page 377. The following list describes the command choices:

KEY This choice enables manual triggering by pressing the front-panel **Trigger** hardkey.

EXT An externally applied signal triggers the waveform. This is the only choice that works with gating. The following conditions affect an external trigger:

- The input connector selected for the trigger signal. You have a choice between the rear-panel PATTERN TRIG IN connector or the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector. To make the connector selection, see “:TRIGger[:SOURce]:EXTernal[:SOURce]” on page 382.

  For more information on the connectors and on connecting the cables, see the *E4428C/38C ESG Signal Generators User’s Guide*.

- The trigger signal polarity:
  - gating mode, see “:TRIGger:TYPE:GATE:ACTive” on page 379
  - continuous and single modes, see “:TRIGger[:SOURce]:EXTernal:SLOPe” on page 382

- The time delay between when the ESG receives a trigger and when the waveform responds to the trigger. There are two parts to setting the delay:
  - setting the amount of delay, see “:TRIGger[:SOURce]:EXTernal:DELay” on page 381
  - turning the delay on, see “:TRIGger[:SOURce]:EXTernal:DELay:STATe” on page 381

BUS	This choice enables triggering over the GPIB or LAN using the `*TRG` or `GET` commands or the AUXILIARY INTERFACE (RS-232) using the `*TRG` command.
Key Entry	**Trigger Key** **Bus** **Ext**

:TRIGger[:SOURce]:EXTernal:DELay

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:TRIGger[:SOURce]:EXTernal:DELay <val>
[:SOURce]:RADio:WCDMa:TGPP:ARB:TRIGger[:SOURce]:EXTernal:DELay?
```

This command sets the amount of time to delay the ESG's response to an external trigger.

The delay is a path (time) delay between when the ESG receives the trigger and when it responds to the trigger. For example, configuring a trigger delay of two seconds, causes the ESG to wait two seconds after receipt of the trigger before the ESG plays the waveform.

The delay does not occur until you turn it on (see ":TRIGger[:SOURce]:EXTernal:DELay:STATe" on page 381). You can set the delay value either before or after turning it on.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 380.

The unit of measurement for the variable <val> is in seconds (nsec–sec).

***RST**	+1.00000000E–003
Range	1E–8 to 4E1
Key Entry	**Ext Delay Time**
Remarks	This command is effective only if an external trigger is selected as the trigger source. Refer to ":TRIGger[:SOURce]" on page 380.

:TRIGger[:SOURce]:EXTernal:DELay:STATe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:TRIGger[:SOURce]:EXTernal:DELay:
STATe ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP:ARB:TRIGger[:SOURce]:EXTernal:DELay:STATe?
```

This command enables or disables the arbitrary waveform generator's external trigger delay.

For setting the delay time, see “:TRIGger[:SOURce]:EXTernal:DELay” on page 381, and for more information on configuring an external source, see“:TRIGger[:SOURce]” on page 380.

***RST** 0

Key Entry **Ext Delay Off On**

:TRIGger[:SOURce]:EXTernal:SLOPe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:TRIGger[:SOURce]:EXTernal:
SLOPe POSitive|NEGative
[:SOURce]:RADio:WCDMa:TGPP:ARB:TRIGger[:SOURce]:EXTernal:SLOPe?
```

This command sets the polarity for an external trigger signal while using the continuous, single triggering mode. To set the polarity for gating, see “:TRIGger:TYPE:GATE:ACTive” on page 379.

The POSitive and NEGative selections correspond to the high (positive) and low (negative) states of the external trigger signal. For example, when you select POSitive, the waveform responds (plays) during the high state of the trigger signal. When the ESG receives multiple trigger occurrences when only one is required, the signal generator uses the first trigger and ignores the rest.

For more information on configuring an external trigger source and to select external as the trigger source, see “:TRIGger[:SOURce]” on page 380.

***RST** NEG

Key Entry **Ext Polarity Neg Pos**

:TRIGger[:SOURce]:EXTernal[:SOURce]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB:TRIGger[:SOURce]:EXTernal
[:SOURce] EPT1|EPT2|EPTRIGGER1|EPTRIGGER2
[:SOURce]:RADio:WCDMa:TGPP:ARB:TRIGger[:SOURce]:EXTernal[:SOURce]?
```

This command selects which PATTERN TRIG IN connection the ESG uses to accept an externally applied trigger signal when external is the trigger source selection.

For more information on configuring an external trigger source and to select external as the trigger source, see “:TRIGger[:SOURce]” on page 380. For more information on the rear-panel connectors, see the *E4428C/38C ESG Signal Generators User’s Guide*.

The following list describes the command choices:

EPT1	This choice is synonymous with EPTRIGGER1 and selects the PATTERN TRIG IN rear-panel connector.
EPT2	This choice is synonymous with EPTRIGGER2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.
EPTRIGGER1	This choice is synonymous with EPT1 and selects the PATTERN TRIG IN rear-panel connector.
EPTRIGGER2	This choice is synonymous with EPT2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.
***RST**	EPT1
Choices	EPT1 EPT2 EPTRIGGER1 EPTRIGGER2

[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP:ARB[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP:ARB[:STATe]?
```

This command enables or disables the W-CDMA modulation format.

ON (1)	This choice enables the W-CDMA modulation capability and sets up the internal hardware to generate the currently selected W-CDMA signal selection.
OFF (0)	This choice disables the W-CDMA baseband signal capability.
***RST**	0
Key Entry	**W-CDMA Off On**
Remarks	This choice also activates the I/Q state and sets the I/Q source to internal.

6 Digital Signal Interface Module Commands

This chapter provides SCPI descriptions for commands available with the N5102A Digital Signal Interface Module. Refer to the *E4428C/38C ESG Signal Generators User's Guide* and *E4428C/38C ESG Signal Generators Key and Data Field Reference* for more information on the N5102A module.

Digital Subsystem—Option 003 and 004 ([:SOURce])

:DIGital:CLOCk:CPS 1|2|4

Supported E4438C Option with option 003 or 004 or both

```
:DIGital:CLOCk:CPS 1|2|4
:DIGital:CLOCk:CPS?
```

This command selects the number of clock cycles per sample. The command is used with parallel or parallel interleaved port configurations. If this command is executed with a serial port configuration or an IF signal type, the parameter value is changed, but it is not used by the interface module until the port configuration is changed to parallel or parallel interleaved, *and* the signal type is changed to IQ.

The query returns the currently set value. Regardless of the port configuration, you must query all four states (clocks per sample, port configuration, data direction, and signal type) to know the interface module's current setup.

Example

```
:DIG:CLOC:CPS 2
```

The preceding example sets two clock cycles for each sample.

***RST** `1`

Range 1,2,or 4

Key Entry **Clocks Per Sample**

:DIGital:CLOCk:PHASe

Supported E4438C Option with option 003 or 004 or both

```
:DIGital:CLOCk:PHASe <val>
:DIGital:CLOCk:PHASe?
```

This command sets the phase for the clock relative to the leading edge transition of the data. At 0 degrees the clock and leading edge of the data signal are aligned. Any phase value between 0 and 360 degrees can be used in the command, however, the signal generator rounds up or down to get 90, 180, 270 and 0 degree settings. For example, entering 140 degrees will cause the signal generator to use the 180 degree setting.

If this command is executed when the clock rate is less than 10 MHz or greater than 200 MHz, the resolution changes to 180 degrees, and the maximum phase defaults to 180 degrees.

Example

```
:DIG:CLOC:PHAS 90DEG
```

The preceding example sets the clock phase to 90 degrees. The clock signal leading edge transition will be delayed by 1/4 of a clock period relative to the leading edge data transition.

***RST**	+0.00000000E+000
Range	0 – 360 deg
Key Entry	**Clock Phase**

:DIGital:CLOCk:POLarity

Supported E4438C Option with option 003 or 004 or both

```
:DIGital:CLOCk:POLarity POSitive|NEGative
:DIGital:CLOCk:POLarity?
```

This command sets the alignment for the clock signal to positive or negative. Positive selects the leading edge transition of the clock signal to align with the leading edge data transition and negative selects the falling edge transition of the clock signal to align with the leading edge of the data.

Example

```
:DIG:CLOC:POL NEG
```

The preceding example sets the clock falling edge transition to align with the leading edge data transition.

***RST**	POS
Key Entry	**Clock Polarity**

:DIGital:CLOCk:RATE

Supported E4438C Option with option 003 or 004 or both

```
:DIGital:CLOCk:RATE <val>
:DIGital:CLOCk:RATE?
```

This command sets the clock rate. If an external clock is used, the rate set with this command must match the external clock rate. Only clock phase settings of 0 or 180 degrees are valid for a clock rate setting below 10 MHz or above 200 MHz. The variable `<val>` is a expressed in hertz

Example

```
:DIG:CLOC:RATE 200MHZ
```

The preceding example sets the clock rate to 200 megahertz.

***RST**	+1.00000000E+008
Range	1 kHz–400 MHz
Key Entry	**Clock Rate**

:DIGital:CLOCk:REFerence:FREQuency

Supported E4438C Option with option 003 or 004 or both

```
:DIGital:CLOCk:REFerence:FREQuency <freq>
:DIG:CLOC:REF:FREQ?
```

This command allows you to specify the frequency of the external reference supplied to the Freq Ref connector. This command is valid only when the clock source is set to internal.

If this command is executed when the clock source is not set to internal, the parameter value is changed, but it is not used by the signal generator until the clock source is changed to internal.

Because a query returns the currently set value, regardless of the clock source, you must query both states (reference frequency and clock source) to know the signal generator’s current setup.

Example

```
:DIG:CLOC:REF:FREQ 50MHZ
```

The preceding example specifies a 50 megahertz external reference frequency.

***RST**	+1.00000000E+007
Range	1kHz–100 MHz
Key Entry	**Reference Frequency**

:DIGital:CLOCk:SKEW

Supported	E4438C Option with option 003 or 004 or both

```
:DIGital:CLOCk:SKEW <val>
:DIGital:CLOCk:SKEW?
```

This command sets the clock signal skew value. The skew is a fine-tune adjustment for the course tune clock phase function and helps to align the clock with valid data states. This is useful at high clock rates and available only for clock frequencies above 10 megahertz. The variable `<val>` is a expressed in nanoseconds.

Example

```
:DIG:CLOC:SKEW 2NS
```

The preceding example sets the clock skew to 2 nanoseconds.

***RST**	+0.00000000E+000
Range	–5ns to 5ns
Key Entry	**Clock Skew**

:DIGital:CLOCk:SOURce

Supported	E4438C Option with option 003 or 004 or both

```
:DIGital:CLOCk:SOURce INTernal|EXTernal|DEVice
:DIG:CLOC:SOURCe?
```

This command selects one of three possible clock sources.

Example

```
:DIG:CLOC:SOUR DEV
```

The preceding example uses the “Device Interface Connector” input clock.

***RST**	INT
Key Entry	**Clock Source**

:DIGital:DATA:ALIGnment

Supported E4438C Option with option 003 or 004 or both

```
:DIGital:DATA:ALIGnment MSB|LSB
:DIGital:DATA:ALIGment?
```

This command selects the bit alignment for a word less than 16 bits in length. The MSB (most significant bit) selection maintains the MSB of the word on the same data line while the LSB (least significant bit) will move depending on the word size. The opposite effect occurs when the alignment is set to LSB.

Example

```
:DIG:DATA:ALIG MSB
```

The preceding example sets the MSB word format.

***RST** LSB

Key Entry **Word Alignment**

:DIGital:DATA:BORDer

Supported E4438C Option with option 003 or 004 or both

```
:DIGital:DATA:BORDer MSB|LSB
:DIGital:DATA:BORD?
```

This command selects the bit order for data transmitted through the N5102A module. Data can be in least significant (LSB) bit first or most significant (MSB) bit first.

Example

```
:DIG:DATA:BORD MSB
```

The preceding example specifies data in MSB first format.

***RST** LSB

Key Entry **Bit Order**

:DIGital:DATA:DIRection

Supported E4438C Option with option 003 or 004 or both

```
:DIGital:DATA:DIRection OUTPut|INPut
:DIGital:DATA:DIRection?
```

This command selects an input or output direction for data flow through the N5102A module.

Example

```
:DIG:DATA:DIR INP
```

The preceding example selects input as the direction of data flow.

***RST** OUTP (unless only Option 004 is installed)

Key Entry **Direction**

:DIGital:DATA:IGain

Supported E4438C Option with option 003 or 004 or both

```
:DIGital:DATA:IGain <val>
:DIGital:DATA:IGain?
```

This command adjust the gain of the I data in the N5102A module. The adjustment does not affect the Q data.

The variable `<val>` is a expressed as a percentage delta from 100%. The offset is an adjustment to the analog level that is represented by the digital sample. The analog voltage is limited to a 16-bit data sample.

Example

```
:DIG:DATA:IG 10
```

The preceding example sets the I data gain to 10%.

***RST** +0.00000000E+000

Range –12.5 through 12.5

Key Entry **I Gain**

:DIGital:DATA:INEGate

Supported	E4438C Option with option 003 or 004 or both

```
:DIGital:DATA:INEGate OFF|ON|0|1
:DIGital:DATA:INEGate?
```

This command enables or disables the negation of the I data sample. Negation changes the sample by expressing it in two's complement form, multiplying by negative one, and converting back to the selected numeric format. This can be done for I samples, Q samples, or both.

The sample or word represents a quantized analog voltage level. This analog voltage can be added or multiplied. For a 16-bit sample, the range is from 0 to 65535 in offset binary or -32768 to +32767 in 2’s complement mode.

Example

```
:DIG:DATA:INEG ON
```

The preceding example enables negation of the I data.

***RST**	0
Key Entry	**Negate I**

:DIGital:DATA:IOFFset

Supported	E4438C Option with option 003

```
:DIGital:DATA:IOFFset <val>
:DIGital:DATA:IOFFset?
```

This command adjusts the DC offset for I data. The command is available for the N5102A module output mode. The variable `<val>` is a expressed as a +/– 100% of the full scale value.

Example

```
:DIG:DATA:IOFF 40
```

The preceding example sets the I offset to 40% of full scale.

***RST**	+0.00000000E+000
Range	–100 to +100
Key Entry	**I Offset**

:DIGital:DATA:IQSWap

Supported E4438C Option with option 003 or 004 or both

```
:DIGital:DATA:IQSWap OFF|ON|0|1
:DIGital:DATA:IQSWap?
```

This command enables or disables swapping of the I and Q data. When enabled, the I data is sent to the N5102A's Q bus and the Q data is sent to the I bus.

Example

```
:DIG:DATA:IQSW ON
```

The preceding example enables swapping of I and Q data.

***RST** 0

Key Entry **Swap IQ**

:DIGital:DATA:NFORmat

Supported E4438C Option with option 003 or 004 or both

```
:DIGital:DATA:NFORMat OBINary|TCOMplement
:DIGital:DATA:NFORMat?
```

This command selects the binary format used to represent the transmitted data values. The selections are offset binary or 2's complement.

Example

```
:DIG:DATA:NFOR OBIN
```

The preceding example selects the offset binary format to represent data values.

***RST** TCOM

Key Entry **Numeric Format**

:DIGital:DATA:POLarity:FRAMe

Supported E4438C Option with option 003 or 004 or both

```
:DIGital:DATA:POLarity:FRAMe POSitive|NEGative
:DIGital:DATA:POLarity:FRAMe?
```

This command selects the polarity of the frame marker for serial transmission. The frame marker indicates the beginning of each sample or byte of data. The command is valid for serial transmission only.

POS	This choice selects a positive polarity. The frame marker is high for the first data sample.
NEG	This choice selects a negative polarity. The frame marker is low for the first data sample.

Example

```
:DIG:DATA:POL:FRAM NEG
```

The preceding example selects a negative polarity for the frame marker.

***RST**	POS
Key Entry	**Frame Polarity**

:DIGital:DATA:POLarity:IQ

Supported E4438C Option with option 003 or 004 or both

```
:DIGital:DATA:POLarity:IQ POSitive|NEGative
:DIGital:DATA:POLarity:IQ?
```

This command selects the logic level for I and Q data. Positive selects a high logic level at the output as a digital one and negative selects a low logic level at the output as a digital one.

POS	This choice selects a logic high level as digital one.
NEG	This choice selects a logic low level as a digital one.

Example

```
:DIG:DATA:POL:IQ NEG
```

The preceding example sets low level logic.

***RST**	POS
Key Entry	**IQ Polarity**

:DIGital:DATA:QGain

Supported E4438C Option with option 003 or 004 or both

```
:DIGital:DATA:QGain <val>
:DIGital:DATA:QGain?
```

This command adjusts the gain for Q data in the N5102A module. The adjustment does not affect the I data.

The variable <val> is a expressed as a percentage delta from 100%. The offset is an adjustment to the analog level that is represented by the digital sample. The analog voltage is limited to a 16-bit data sample.

Example

```
:DIG:DATA:QG 10
```

The preceding example increases the gain for Q data by 10%.

***RST**	+0.00000000E+000
Range	–12.5 through 12.5
Key Entry	**Q Gain**

:DIGital:DATA:QNEGate

Supported E4438C Option with option 003 or 004 or both

```
:DIGital:DATA:QNEGate OFF|ON|0|1
:DIGital:DATA:QNEGate?
```

This command enables or disables the negation of the Q data sample. Negation changes the sample by expressing it in two's complement form, multiplying by negative one, and converting back to the selected numeric format.

The sample or word represents a quantized analog voltage level. This analog voltage can be added or multiplied. For a 16-bit sample, the range is from 0 to 65535 in offset binary or -32768 to +32767 in 2’s complement mode.

Example

```
:DIG:DATA:QNEG ON
```

The preceding example enables negation of the Q data.

***RST**	0
Key Entry	**Negate Q**

:DIGital:DATA:QOFFset

Supported E4438C Option with option 003

```
:DIGital:DATA:QOFFset <val>
:DIGital:DATA:QOFFset?
```

This command adjusts the DC offset for Q data. The command is available for the N5102A module output mode. The variable `<val>` is a expressed as a +/– 100% of the full scale value.

Example

```
:DIG:DATA:QOFF 40
```

The preceding example sets the Q offset to 40% of full scale.

***RST** +0.00000000E+000

Range –100 through 100

Key Entry **Q Offset**

:DIGital:DATA:ROTation

Supported E4438C Option with option 003

```
:DIGital:DATA:ROTation <val>
:DIGital:DATA:ROTation?
```

This command rotates the IQ data in the IQ plane. This command is valid for the N5102A output mode. The variable `<val>` is expressed in degrees with a range from 0 to 360.

Example

```
:DIG:DATA:ROT 45
```

The preceding example rotates the IQ constellation 45 degrees.

***RST** +1.00000000E+000

Range 0–360

Key Entry **Rotation**

:DIGital:DATA:SCALing

Supported E4438C Option with option 003

```
:DIGital:DATA:SCALing <val>
:DIGital:DATA:SCALing?
```

This command enables scaling of the I and Q data to the level indicated by the `<val>` variable. This command is valid for the N5102A output mode. The variable `<val>` is expressed as a percentage.

Example

```
:DIG:DATA:SCAL 50
```

The preceding example scales the I and Q data to amplitude to 50%.

***RST** +1.00000000E+002

Range –100 through 100

Key Entry **Scaling**

:DIGital:DATA:SIZE

Supported E4438C Option with option 003 or 004 or both

```
:DIGital:DATA:SIZE <val>
:DIGital:DATA:SIZE?
```

This command selects the number of bits in each sample. A sample can have a maximum word length of 16 bits.

Example

```
:DIG:DATA:SIZE 8
```

The preceding example sets the sample word size to eight bits.

***RST** +1.600000000E+001

Range 4–16

Key Entry **Word Size**

:DIGital:DATA:STYPe

Supported E4438C Option with option 003

```
:DIGital:DATA:STYPe IQ|IF
:DIGital:DATA:STYPe?
```

This command selects the output format for the IQ data. The IQ selection outputs digital I and Q data. Whereas the IF (intermediate frequency) selection modulates the I and Q data onto the IF frequency. The IF is calculated as 1/4 the clock sample rate. This command is valid only for the N5102A output mode.

IQ This choice outputs I and Q digital data.

IF This choice outputs a modulated signal.

Example

```
:DIG:DATA:STYP IF
```

The preceding example sets the I and Q output data to modulate the intermediate frequency.

***RST** IQ

Key Entry **Signal Type**

:DIGital:DATA:TYPE

Supported E4438C Option with option 003 or 004 or both

```
:DIGital:DATA:TYPE SAMPles|PFSamples
:DIGital:DATA:TYPE?
```

This command selects filtered baseband data or unfiltered baseband data as the transmitted data type.

If this command is executed while an ARB modulation format is active, the parameter choice is changed, but it is not *used* by the interface module until a real-time modulation format is turned on.

Because a query returns the current choice, regardless of whether or not an ARB format is active, you must query both states (data type and the modulation format) to know the signal generator's current setup.

SAMPles This choice selects DAC samples as the data transmitted.

PFSamples This choice selects pre-filtered samples which are unfiltered I and Q data.

Example

`:DIG:DATA:TYPE PFS`

The preceding example sets the data type to pre-filtered I and Q data.

***RST**	SAMP
Key Entry	**Data Type**

:DIGital:DIAGnostic:LOOPback

Supported	E4438C Option with option 003 or 004 or both

`:DIGital:DIAGnostic:LOOPback? DIGBus|CABLe|N5102A|DEVice`

This command selects and executes a loop back test that validates the integrity of digital data. Refer to the E4428C/38C ESG Signal Generators Key and Data Field Reference for more information.

DIGBus	This choice selects a loop back test on the ESG Digital Bus connector at the signal generator side.
CABLe	This choice selects a loop back test using the Digital Bus Loop Back Fixture test board.
N5102A	This choice selects a loop back test for the N5102A module.
DEVice	This choice selects a loop back test using the LOOP BACK TEST SINGLE ENDED IO DUAL 40 PIN board.

Example

`:DIG:DIAG:LOOP? DEV`

The preceding example runs the diagnostic test on the Single Ended IO Dual 40 Pin device and returns a pass or fail condition.

***RST**	Device Intfc
Key Entry	**Loop Back Test Type**

:DIGital:LOGic[:TYPE]

Supported	E4438C Option with option 003 or 004 or both

```
:DIGital:LOGic[:TYPE] LVDS|LVTT1|CMOS15|CMOS18|CMOS25|CMOS33|SSI
:DIGital:LOGic[:TYPE]?
```

This command selects the logic data type used by the device being tested.

LVDS	This choice selects low voltage differential signaling as the logic data type.

LVTT1	This choice selects a low voltage TTL signal as the logic data type.
CMOS15	This choice selects a 1.5 volt CMOS signal as the logic data type.
CMOS18	This choice selects a 1.8 volt CMOS signal as the logic data type.
CMOS25	This choice selects a 2.5 volt CMOS signal as the logic data type.
CMOS33	This choice selects a 3.3 volt CMOS signal as the logic data type.
SSI	This key sets the logic type of the device interface to SSI. This logic type uses single ended I/O and a 3.3 volt supply. This is a special serial interface.

Example

```
:DIG:LOG CMOS15
```

The preceding example selects 1.5 volt CMOS as the logic data type.

***RST** CMOS33

Key Entry **Logic Type**

:DIGital:PCONfig

Supported E4438C Option with option 003 or 004 or both

```
:DIGital:PCONfig PARallel|SERial|PINTIQ|PINTQI
:DIGital:PCONfig?
```

This command selects the data transmission type used for communication between the N5102A module and the device under test. Refer to the E4428C/38C ESG Signal Generators Key and Data Field Reference for more information.

PARallel	This choice selects parallel data transmission.
SERial	This choice selects serial data transmission.
PINTIQ	This choice selects parallel interleaving data transmission. The I data is transmitted on the rising clock edge and the Q data on the falling edge.
PINTQI	This choice selects parallel interleaving data transmission. The Q data is transmitted on the rising clock edge and the I data on the falling edge.

Example

```
:DIG:PCON PINTQI
```

The preceding example selects parallel interleaving format

***RST** PAR

Key Entry **Port Config**

:DIGital:PRESet:PTHRough

Supported E4438C Option with option 003 or 004 or both

`:DIGital:PRESet:PTHRough`

This command sets up the preset condition for the N5102A module and allows transmission of data through the module with no modifications. The command is valid only when a modulation format is active.

Example

`:DIG:PRES:PTHR`

The preceding example sets the N5102A module to a preset condition and allows data to pass through unmodified.

Key Entry **Pass Through Preset**

:DIGital[:STATe]

Supported E4438C Option with option 003 or 004 or both

```
:DIGital[:STATe] 0|1|OFF|ON
:DIGital[:STATe]?
```

This command enables or disables the operating state of the N5102A module.

Example

`:DIG ON`

The preceding example turns on the N5102A module.

***RST** OFF

Key Entry **N5102A Off On**

7 Bit Error Rate Test (BERT) Commands

This chapter provides SCPI description for commands dedicated to BERT testing using the E4438C ESG Vector Signal Generator. This chapter contains the following sections:

Calculate Subsystem–Option UN7 and 300 (:CALCulate:BERT)

:BTS:LOOPback:EDGE:ETCH:F43:COMParator:CRITeria:ERATe

Supported E4438C with Option 300

`:CALCulate:BERT:BTS:LOOPback:EDGE:ETCH:F43:COMParator:CRITeria:`
`ERATe` <val>
`:CALCulate:BERT:BTS:LOOPback:EDGE:ETCH:F43:COMParator:CRITeria:ERATe?`

This command sets the error rate pass/fail threshold value.

The variable <val> is a decimal notation representing a percentage value.

***RST** +1.00000000E-001

Range 0.0–1.0

Key Entry Error Rate

:BTS:LOOPback:EDGE:ETCH:F43:COMParator:CRITeria[:SELect]

Supported E4438C with Option 300

`:CALCulate:BERT:BTS:LOOPback:EDGE:ETCH:F43:COMParator:`
`CRITeria[:SELect]` ERATe|NOLimit
`:CALCulate:BERT:BTS:LOOPback:EDGE:ETCH:F43:COMParator:CRITeria[:SELect]?`

This command determines which of the following pass/fail limit (comparator) criteria is applied to the measurement.

ERATe This choice reports, on the front panel display of the signal generator, the pass or fail status compared to the specified threshold for the error rate.

NOLimit This choice disables the pass/fail indication.

***RST** NOLimit

Key Entry **Error Rate** **No Limits**

:BTS:LOOPback:EDGE:MCS5:COMParator:CRITeria:ERATe

Supported E4438C with Option 300

`:CALCulate:BERT:BTS:LOOPback:EDGE:MCS5:COMParator:CRITeria:ERATe` <val>
`:CALCulate:BERT:BTS:LOOPback:EDGE:MCS5:COMParator:CRITeria:ERATe?`

This command sets the error rate pass/fail threshold value.

The variable <val> is a decimal notation representing a percentage value.

***RST** +1.00000000E-001

Range 0.0–1.0

Key Entry **Error Rate**

:BTS:LOOPback:EDGE:MCS5:COMParator:CRITeria[:SELect]

Supported E4438C with Option 300

`:CALCulate:BERT:BTS:LOOPback:EDGE:MCS5:COMParator:`
`CRITeria[:SELect] ERATe`|NOLimit
`:CALCulate:BERT:BTS:LOOPback:EDGE:MCS5:COMParator:CRITeria[:SELect]?`

This command determines which of the following pass/fail limit (comparator) criteria is applied to the measurement.

ERATe This choice reports, on the front panel display of the signal generator, the pass or fail status compared to the specified threshold for the error rate.

NOLimit This choice disables the pass/fail indication.

***RST** NOLimit

Key Entry **Error Rate** **No Limits**

:BTS:LOOPback:EDGE:MCS9:COMParator:CRITeria:ERATe

Supported E4438C with Option 300

`:CALCulate:BERT:BTS:LOOPback:EDGE:MCS9:COMParator:CRITeria:ERATe` <val>
`:CALCulate:BERT:BTS:LOOPback:EDGE:MCS9:COMParator:CRITeria:ERATe?`

This command sets the error rate pass/fail threshold value.

The variable <val> is a decimal notation representing a percentage value.

***RST** +1.00000000E-001

Range 0.0–1.0

Key Entry **Error Rate**

:BTS:LOOPback:EDGE:MCS9:COMParator:CRITeria[:SELect]

Supported E4438C with Option 300

`:CALCulate:BERT:BTS:LOOPback:EDGE:MCS9:COMParator:`
`CRITeria[:SELect] ERATe`|NOLimit
`:CALCulate:BERT:BTS:LOOPback:EDGE:MCS9:COMParator:CRITeria[:SELect]?`

This command determines which of the following pass/fail limit (comparator) criteria is applied to the measurement.

ERATe This choice reports, on the front panel display of the signal generator, the pass or fail status compared to the specified threshold for the error rate.

NOLimit This choice disables the pass/fail indication.

***RST** NOLimit

Key Entry **Error Rate** **No Limits**

:BTS:LOOPback:EDGE:UNCoded:COMParator:CRITeria:ERATe

Supported E4438C with Option 300

`:CALCulate:BERT:BTS:LOOPback:EDGE:UNCoded:COMParator:CRITeria:`
`ERATe` <val>
`:CALCulate:BERT:BTS:LOOPback:EDGE:UNCoded:COMParator:CRITeria:ERATe?`

This command sets the error rate pass/fail threshold value.

The variable <val> is a decimal notation representing a percentage value.

***RST** +2.00000000E-002

Range 0.0–1.0

Key Entry **Error Rate**

:BTS:LOOPback:EDGE:UNCoded:COMParator:CRITeria[:SELect]

Supported E4438C with Option 300

```
:CALCulate:BERT:BTS:LOOPback:EDGE:UNCoded:COMParator:
CRITeria[:SELect] ERATe|NOLimit
:CALCulate:BERT:BTS:LOOPback:EDGE:Uncoded:COMParator:CRITeria[:SELect]?
```

This command determines which of the following pass/fail limit (comparator) criteria is applied to the measurement.

ERATe This choice reports, on the front panel display of the signal generator, the pass or fail status compared to the specified threshold for the error rate.

NOLimit This choice disables the pass/fail indication.

***RST** NOLimit

Key Entry **Error Rate** **No Limits**

:BTS:LOOPback:GSM:CS1:COMParator:CRITeria:ERATe

Supported E4438C with Option 300

```
:CALCulate:BERT:BTS:LOOPback:GSM:CS1:COMParator:CRITeria:
ERATe <val>
:CALCulate:BERT:BTS:LOOPback:GSM:CS1:COMParator:CRITeria:ERATe?
```

This command sets the error rate pass/fail threshold value.

The variable <val> is a decimal notation representing a percentage value.

***RST** +1.00000000E-001

Range 0.0–1.0

Key Entry **Error Rate**

:BTS:LOOPback:GSM:CS1:COMParator:CRITeria[:SELect]

Supported E4438C with Option 300

```
:CALCulate:BERT:BTS:LOOPback:GSM:CS1:COMParator:
CRITeria[:SELect] ERATe|NOLimit
:CALCulate:BERT:BTS:LOOPback:GSM:CS1:COMParator:CRITeria[:SELect]?
```

This command determines which of the following pass/fail limit (comparator) criteria is applied to the measurement.

ERATe	This choice reports, on the front panel display of the signal generator, the pass or fail status compared to the specified threshold for the error rate.
NOLimit	This choice disables the pass/fail indication.
***RST**	NOLimit
Key Entry	**Error Rate** **No Limits**

:BTS:LOOPback:GSM:CS4:COMParator:CRITeria:ERATe

Supported E4438C with Option 300

```
:CALCulate:BERT:BTS:LOOPback:GSM:CS4:COMParator:CRITeria:
ERATe <val>
:CALCulate:BERT:BTS:LOOPback:GSM:CS4:COMParator:CRITeria:ERATe?
```

This command sets the error rate pass/fail threshold value.

The variable <val> is a decimal notation representing a percentage value.

***RST**	+1.00000000E-001
Range	0.0–1.0
Key Entry	**Error Rate**

:BTS:LOOPback:GSM:CS4:COMParator:CRITeria[:SELect]

Supported E4438C with Option 300

```
:CALCulate:BERT:BTS:LOOPback:GSM:CS4:COMParator:
CRITeria[:SELect] ERATe|NOLimit
:CALCulate:BERT:BTS:LOOPback:GSM:CS4:COMParator:CRITeria[:SELect]?
```

This command determines which of the following pass/fail limit (comparator) criteria is applied to the measurement.

ERATe	This choice reports, on the front panel display of the signal generator, the pass or fail status compared to the specified threshold for the error rate.
NOLimit	This choice disables the pass/fail indication.
***RST**	NOLimit
Key Entry	**Error Rate** **No Limits**

:BTS:LOOPback:GSM:MCS1:COMParator:CRITeria:ERATe

Supported E4438C with Option 300

```
:CALCulate:BERT:BTS:LOOPback:GSM:MCS1:COMParator:CRITeria:
ERATe <val>
:CALCulate:BERT:BTS:LOOPback:GSM:MCS1:COMParator:CRITeria:ERATe?
```

This command sets the error rate pass/fail threshold value.

The variable <val> is a decimal notation representing a percentage value.

***RST**	+1.00000000E-001
Range	0.0–1.0
Key Entry	**Error Rate**

:BTS:LOOPback:GSM:MCS1:COMParator:CRITeria[:SELect]

Supported E4438C with Option 300

```
:CALCulate:BERT:BTS:LOOPback:GSM:MCS1:COMParator:
CRITeria[:SELect] ERATe|NOLimit
:CALCulate:BERT:BTS:LOOPback:GSM:MCS1:COMParator:CRITeria[:SELect]?
```

This command determines which of the following pass/fail limit (comparator) criteria is applied to the measurement.

ERATe	This choice reports, on the front panel display of the signal generator, the pass or fail status compared to the specified threshold for the error rate.
NOLimit	This choice disables the pass/fail indication.
***RST**	ERAT
Key Entry	**Error Rate** **No Limits**

:BTS:LOOPback:GSM:COMParator:CRITeria:CIB

Supported E4438C with Option 300

`:CALCulate:BERT:BTS:LOOPback:GSM:COMParator:CRITeria:CIB` <val>
`:CALCulate:BERT:BTS:LOOPback:GSM:COMParator:CRITeria:CIB?`

This command sets the Class II residual bit error rate pass/fail threshold value.

The variable <val> is a decimal notation representing a percentage value.

***RST** +4.00000000E-003

Range 0.0–1.0

Key Entry **Class Ib RBER**

:BTS:LOOPback:GSM:COMParator:CRITeria:CII

Supported E4438C with Option 300

`:CALCulate:BERT:BTS:LOOPback:GSM:COMParator:CRITeria:CII` <val>
`:CALCulate:BERT:BTS:LOOPback:GSM:COMParator:CRITeria:CII?`

This command sets the Class Ib residual bit error rate pass/fail threshold value.

The variable <val> is a decimal notation representing a percentage value.

***RST** +2.00000000E-002

Range 0.0–1.0

Key Entry **Class II RBER**

:BTS:LOOPback:GSM:COMParator:CRITeria:FERasure

Supported E4438C with Option 300

`:CALCulate:BERT:BTS:LOOPback:GSM:COMParator:CRITeria:FERasure` <val>
`:CALCulate:BERT:BTS:LOOPback:GSM:COMParator:CRITeria:FERasure?`

This command sets the frame erasure rate pass/fail threshold value.

The variable <val> is a decimal notation representing a percentage value.

***RST** +1.00000000E-003

Range 0.0–1.0

Key Entry **Frame Erasure**

:BTS:LOOPback:GSM:COMParator:CRITeria[:SELect]

Supported E4438C with Option 300

`:CALCulate:BERT:BTS:LOOPback:GSM:COMParator:CRITeria[:SELect] FERasure|`
CLIB|CLII|ANY|NOLimit
`:CALCulate:BERT:BTS:LOOPback:GSM:COMParator:CRITeria[:SELect]?`

This command determines which of the following pass/fail limit (comparator) criteria is applied to the measurement.

FERasure	This choice reports, on the front panel display of the signal generator, the pass or fail status compared to the specified threshold for frame erasure ratio.
CLIB	This choice reports, on the front panel display of the signal generator, the pass or fail status compared to the specified threshold for the number of Class Ib errors detected in the measurement.
CLII	This choice reports, on the front panel display of the signal generator, the pass or fail status compared to the specified threshold for the number of Class II errors detected in the measurement.
ANY	This choice reports, on the front panel display of the signal generator, the pass or fail status compared to all of the specified comparator criteria.
NOLimit	This choice disables the pass/fail indication.

***RST** NOLimit

Key Entry **Frame Erasure** **Class Ib RBER** **Class II RBER** **Exceeds Any Limit** **No Limits**

[:BASeband]:COMParator:MODE

Supported E4438C with Option UN7

```
:CALCulate:BERT[:BASeband]:COMParator:MODE CEND|FHOLd
:CALCulate:BERT[:BASeband]:COMParator:MODE?
```

This command selects the pass/fail judgement mode of the comparator function.

CEND	This choice selects the cycle end mode and each BER measurement result is compared with the limit value to make a pass/fail assessment at the end of a cycle.
FHOLd	This choice selects the fail hold mode and only one fail judgement is allowed during that BER measurement loop. Any failed judgement after the first failure is ignored.

***RST**	CEND
Key Entry	**Cycle End** **Fail Hold**
Remarks	For automated tests, the results of this command can be accessed from the rear panel BER TEST OUT pin on the AUX I/O connector. For more information about the rear panel AUX I/O connector pin configuration, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

[:BASeband]:COMParator:THReshold

Supported E4438C with Option UN7

```
:CALCulate:BERT[:BASeband]:COMParator:THReshold <val>
:CALCulate:BERT[:BASeband]:COMParator:THReshold?
```

This command specifies the threshold value for the pass/fail judgement function.

The variable <val> is a decimal notation representing a percentage value.

***RST**	+1.00000000E-002
Range	0.0000001–1.00
Key Entry	**Pass/Fail Limits**
Remarks	This command is valid only while the BER pass/fail command is active. Refer to "[:BASeband]:COMParator[:STATe]" on page 412.

[:BASeband]:COMParator[:STATe]

Supported E4438C with Option UN7

```
:CALCulate:BERT[:BASeband]:COMParator[:STATe] ON|OFF|1|0
:CALCulate:BERT[:BASeband]:COMParator[:STATe]?
```

This command enables or disables the pass/fail judgement function.

***RST**	0
Key Entry	**Pass/Fail Off On**

[:BASeband]:DISPlay:MODE:

Supported E4438C with Option UN7

```
:CALCulate:BERT[:BASeband]:DISPlay:MODE PERCent|SCIentific
:CALCulate:BERT[:BASeband]:DISPlay:MODE?
```

This command selects the display mode for the bit error rate (BER) measurement.

PERCent This choice reports measurement results as a percentage.

SCIentific This choice reports measurement results in scientific notation.

***RST** PERC

Key Entry **BER Display % Exp**

[:BASeband]:DISPlay:UPDate:

Supported E4438C with Option UN7

```
:CALCulate:BERT[:BASeband]:DISPlay:UPDate CEND|CONT
:CALCulate:BERT[:BASeband]:DISPlay:UPDate?
```

This command selects the display update mode during bit error rate (BER) measurements.

CEND This choice selects the cycle end mode and the previous BER measurement result is displayed during the current measurement cycle.

CONT This choice selects the continuous mode and the display shows the real-time intermediate results during that BER measurement cycle.

***RST** CONT

Key Entry **Update Display Cycle End Cont**

Data Subsystem–Option UN7 and 300 (:DATA)

:BERT:BTS:LOOPback:EDGE:ETCH:F43[:DATA]

Supported E4438C with Option 300

`:DATA:BERT:BTS:LOOPback:EDGE:ETCH:F43[:DATA]? IEC|IEBC|DEFC|BCO|IER|IABer|ALL|TEC|TEBC|TDEFc|TBCO|TER|TABer|TALL|JUDGe|STOP|SCAuse`

This data query returns the measurement result value for each variable.

IEC|IEBC|DEFC|BCO|IER|IABer are intermediate values, so during the measurement, these variables are updated as well as the display information.

At the end of the measurement, the final values are stored to: TEC|TEBC|TDEFc|TBCO|TER|TABer variables. These variables and JUDGe|STOP|SCAuse are not updated until the next BER measurement is completed.

IEC	This choice provides the intermediate error count with the following range: <Integer> 0 to 1500000.
IEBC	This choice provides the intermediate non-erased bit error blocks with the following range: <Integer> 0 to 1500000.
DEFC	This choice provides the intermediate downlink error frame count with the following range: <Integer> 0 to 750000.
BCO	This choice provides the intermediate block or bit count with the following range: <Integer> 0 to 1500000 (block).
IER	This choice provides the intermediate error ratio with the following range: <Real> 0 to 1 (0 to 100%).
IABer	This choice provides the intermediate average BER within blocks that have errors. The range is as follows: <Real> 0 to 1.
ALL	This choice returns all intermediate values (IEC, IEBC, DEFC, BCO, IER, and IABer) at the same time.
TEC	This choice provides the total error count with the following range: <Integer> 0 to 1500000 (block).
TEBC	This choice provides the total non-erased bit error blocks count with the following range: <Integer> 0 to 1500000.
TDEFc	This choice provides the total downlink error frame count with the following range: <Integer> 0 to 65535.

TBCO	This choice provides the total block count with the following range: <Integer> 0 to 1500000 (block).
TER	This choice provides the total error ratio with the following range: <Real> 0 to 1 (0 to 100%).
TABer	This choice provides the total average BER within blocks that have errors. The range is as follows: <Real> 0 to 1.
TALL	This choice returns all total values (TEC, TEBC, TDEFc, TBCO, TER, TABer, JUDGe, STOP, and SCAuse) at the same time. If accidental TCH synchronization loss caused the measurement to stop, `TSLoss` is returned.
JUDGe	This choice provides the pass or fail string. If pass/fail criteria is NOLimit, `NONE` is returned.
STOP	This choice checks to see if the stop threshold is met and returns one of the following values: <Enumerated set> `TRUE FALSE`. When threshold to stop criteria is NONE, `FALSE` is returned.
SCAuse	This choice provides the stop cause by returning one of the following values: <Enumerated set> `NONE Ebit EBLock TSL`. If accidental TCH synchronization loss caused the measurement to stop, `TSL` is returned.

:BERT:BTS:LOOPback:EDGE:MCS5[:DATA]

Supported E4438C with Option 300

```
:DATA:BERT:BTS:LOOPback:EDGE:MCS5[:DATA]? IEC|IEBC|DEFC|BCO|IER|IABer|
ALL|TEC|TEBC|TDEFc|TBCO|TER|TABer|TALL|JUDGe|STOP|SCAuse
```

This data query returns the measurement result value for each variable.

IEC|IEBC|DEFC|BCO|IER|IABer are intermediate values, so during the measurement, these variables are updated as well as the display information. ALL returns all intermediate values at the same time.

At the end of the measurement, the final values are stored to: TEC|TEBC|TDEFc|TBCO|TER|TABer variables. These variables and JUDGe|STOP|SCAuse are not updated until the next BER measurement is completed.

For more information on the parameters, refer to page 414.

:BERT:BTS:LOOPback:EDGE:MCS9[:DATA]

Supported E4438C with Option 300

`:DATA:BERT:BTS:LOOPback:EDGE:MCS9[:DATA]? IEC|IEBC|DEFC|BCO|IER|IABer|ALL|TEC|TEBC|TDEFc|TBCO|TER|TABer|TALL|JUDGe|STOP|SCAuse`

This data query returns the measurement result value for each variable.

IEC|IEBC|DEFC|BCO|IER|IABer are intermediate values, so during the measurement, these variables are updated as well as the display information. ALL returns all intermediate values at the same time.

At the end of the measurement, the final values are stored to: TEC|TEBC|TDEFc|TBCO|TER|TABer variables. These variables and JUDGe|STOP|SCAuse are not updated until the next BER measurement is completed.

For more information on the parameters, refer to page 414.

:BERT:BTS:LOOPback:EDGE:UNCoded[:DATA]

Supported E4438C with Option 300

`:DATA:BERT:BTS:LOOPback:EDGE:UNCoded[:DATA]? IEC|IEBC|DEFC|BCO|IER|IABer|ALL|TEC|TEBC|TDEFc|TBCO|TER|TABer|TALL|JUDGe|STOP|SCAuse`

This data query returns the measurement result value for each variable.

IEC|IEBC|DEFC|BCO|IER|IABer are intermediate values, so during the measurement, these variables are updated as well as the display information. ALL returns all intermediate values at the same time.

At the end of the measurement, the final values are stored to: TEC|TEBC|TDEFc|TBCO|TER|TABer variables. These variables and JUDGe|STOP|SCAuse are not updated until the next BER measurement is completed.

For more information on the parameters, refer to page 414.

:BERT:BTS:LOOPback:GSM[:DATA]

Supported E4438C with Option 300

`:DATA:BERT:BTS:LOOPback:GSM[:DATA]? IBC|IIC|FEC|DFEC|FRC|IBBer|ALL|TEC|TEBC|TDEFc|TBCO|TER|TABer|TALL|JUDGe|STOP|SCAuse`

This data query returns the measurement result value for each variable.

`IBC|IIC|FEC|DEFC|FRC|IBBer|IIBer|FER` are intermediate values, so during the measurement, these variables are updated as well as the display information. `ALL` returns intermediate values at the same time.

At the end of the measurement, the final values are stored to: `TIBC|TIIC|TFEC|TDEFc|TFRC|TIBBer|TIIBer|TFER` variables. These variables and `JUDGe|JCAuse|STOP|SCAuse` are not updated until the next BER measurement is completed. `TALL` returns all of the total values at the same time.

IBC	This choice provides the intermediate class Ib error count with the following range: <Integer> 0 to 792000000.
IIC	This choice provides the intermediate class II error count with the following range: <Integer> 0 to 468000000.
FEC	This choice provides the intermediate frame erasure count with the following range: <Integer> 0 to 6000000.
DEFC	This choice provides the intermediate downlink error frame count with the following range: <Integer> 0 to 65535.
FRC	This choice provides the intermediate frame count with the following range: <Integer> 0 to 6000000.
IBBer	This choice provides the intermediate class Ib error ratio with the following range: <Real> 0 to 1 (0 to 100%).
IIBer	This choice provides the intermediate class II error ratio with the following range: <Real> 0 to 1 (0 to 100%).
FER	This choice provides the intermediate frame erasure ratio with the following range: <Real> 0 to 1 (0 to 100%).
ALL	This choice provides all intermediate values (IBC, IIC, FEC, DEFC, FRC, IBBer, IIBer, FER) at the same time.
TIBC	This choice provides the total class Ib bit error count with the following range: <Integer> 0 to 792000000.
TIIC	This choice provides the total class II bit error count with the following range: <Integer> 0 to 468000000.
TFEC	This choice provides the total frame erasure count with the following range: <Integer> 0 to 6000000.
TDEFc	This choice provides the total downlink error frame count with the following range: <Integer> 0 to 65535.
TFRC	This choice provides the total frame count with the following range: <Integer> 0 to 6000000.
TIBBer	This choice provides the total class Ib error ratio with the following range: <Real> 0 to 1 (0 to 100%).

TIIBer	This choice provides the total class II error ratio with the following range: <Real> 0 to 1 (0 to 100%).
TFER	This choice provides the total frame erasure ratio with the following range: <Real> 0 to 1 (0 to 100%).
TALL	This choice returns all total values (TIBC TIIC TFEC TDEFc TFRC TIBBer TIIBer TFER JUDGe JCAuse STOP SCAuse) at the same time. If accidental TCH synchronization loss caused the measurement to stop, `TSLoss` is returned.
JUDGe	This choice provides the comparator result (TEST OUT) with the following values: <Enumerated set> FAIL PASS NONE. If pass/fail criteria is NOLimit, `NONE` is returned
JCAuse	This choice provides which limit was met to cause the comparator result by returning one of the following values: <Enumerated set> NOLimit FER CIB CII
STOP	This choice checks to see if the stop threshold is met and returns one of the following values: <Enumerated set> `TRUE FALSE`. When threshold to stop criteria is NONE, `FALSE` is returned.
SCAuse	This choice provides the stop cause by returning one of the following values: <Enumerated set> NONE FE CIB CII TSLoss. If accidental TCH synchronization loss caused the measurement to stop, `TSLoss` is returned.

:BERT:BTS:LOOPback:GSM:CS1[:DATA]

Supported E4438C with Option 300

```
:DATA:BERT:BTS:LOOPback:GSM:CS1[:DATA]? IEC|IEBC|DEFC|BCO|IER|
IABer|ALL|TEC|TEBC|TDEFc|TBCO|TER|TABer|TALL|JUDGe|STOP|SCAuse
```

This data query returns the measurement result value for each variable.

IEC|IEBC|DEFC|BCO|IER|IABer are intermediate values, so during the measurement, these variables are updated as well as the display information. ALL returns all intermediate values at the same time.

At the end of the measurement, the final values are stored to: TEC|TEBC|TDEFc|TBCO|TER|TABer variables. These variables and JUDGe|STOP|SCAuse are not updated until the next BER measurement is completed.

For more information on the parameters, refer to page 414.

:BERT:BTS:LOOPback:GSM:CS4[:DATA]

Supported E4438C with Option 300

```
:DATA:BERT:BTS:LOOPback:GSM:CS4[:DATA]? IEC|IEBC|DEFC|BCO|IER|
IABer|ALL|TEC|TEBC|TDEFc|TBCO|TER|TABer|TALL|JUDGe|STOP|SCAuse
```

This data query returns the measurement result value for each variable.

IEC|IEBC|DEFC|BCO|IER|IABer are intermediate values, so during the measurement, these variables are updated as well as the display information. ALL returns all intermediate values at the same time.

At the end of the measurement, the final values are stored to: TEC|TEBC|TDEFc|TBCO|TER|TABer variables. These variables and JUDGe|STOP|SCAuse are not updated until the next BER measurement is completed.

For more information on the parameters, refer to page 414.

:BERT:BTS:LOOPback:GSM:MCS1[:DATA]

Supported E4438C with Option 300

```
:DATA:BERT:BTS:LOOPback:GSM:MCS1[:DATA]? IEC|IEBC|DEFC|BCO|IER|
IABer|ALL|TEC|TEBC|TDEFc|TBCO|TER|TABer|TALL|JUDGe|STOP|SCAuse
```

This data query returns the measurement result value for each variable.

IEC|IEBC|DEFC|BCO|IER|IABer are intermediate values, so during the measurement, these variables are updated as well as the display information. ALL returns all intermediate values at the same time.

At the end of the measurement, the final values are stored to: TEC|TEBC|TDEFc|TBCO|TER|TABer variables. These variables and JUDGe|STOP|SCAuse are not updated until the next BER measurement is completed.

For more information on the parameters, refer to page 414.

:BERT:AUXout

Supported E4438C with Option UN7

```
:DATA:BERT[:BASeband]:AUXout ERRor|REFerence|PN9
:DATA:BERT[:BASeband]:AUXout?
```

This command selects a pre-defined output signal configuration for pins on the AUX I/O rear panel connector. Refer to Table 7-1 for the output pin configuration and signal type.

ERRor This choice selects the bit error rate (BER) information output.

REFerence This choice selects the reference information output.

PN9 This choice selects a pseudo-random data output.

Table 7-1 AUX I/O pin configurations

Pin#	ERRor	REFerence	PN9
1	BER Meas End	BER Data Out	PN9 Data
4	BER Sync Loss	Sync Start	No signal
20	BER Test Out	BER Clock Out	PN9 Clock
21	BER Error Out	BER Error Out	BER Error Out
22	BER No Data	Reference Data	No signal

BER Meas End A signal at this pin indicates the status of the bit error rate (BER) measurements. BER measurements are being executed when the signal is high.

BER Sync loss A low signal at this pin indicates that the synchronization is lost. This signal is valid only when the signal at the BER Meas End pin is high.

BER Test Out A signal at this pin indicates the test result of the bit error rate measurements. The result is guaranteed at the falling edge of the BER Meas End signal. The result is pass when the signal is low; the result is fail when the signal is high. The signal is also high when the pass/fail judgment is set to off.

BER Error Out A signal at this pin indicates the number of the error bits. The output is normally low. One pulse signal (pulse width matches the input clock) indicates one error bit. Pulses for the error bits of one measurement cycle are not synchronized with the rear panel connector BER CLK IN signal and are output when the BER Meas End signal is high.

BER No Data A low signal at this pin indicates the no data status. The no data status is reported when there has been no clock inputs for more than 3 seconds or there has been no data change for more than 200 bits. This signal is valid only when the signal of the BER Meas End output signal is high.

BER Clock Out The BER Clock Out signal monitors the rear panel BER CLK IN signal after polarity control, delay control, and gate control (if applicable) have taken place.

BER Data Out This is a data stream for the bit error rate measurements. The clock signal is used to trigger the reading of the data.

Sync Start This signal indicates the timing when the PN generator starts to generate a PN sequence. This signal can also indicate if the hardware is triggering a PN synchronization or making a measurement when the signal is high.

PN9 Clock	This signal is the clock signal for the PN9 Data. The falling edge of the PN9 Clock indicates the center of PN9 Data. The PN9 Clock rate is 37.5Mbits per second.
PN9 Data	This signal is PN9 data for the self-loopback test.
Reference Data	This signal uses the pseudo-random bit stream as the reference signal.
***RST**	ERRor
Key Entry	**Error Out** **Reference Out** **PN9 Out**

[:DATA]

Supported E4438C with Option UN7

`:DATA[:DATA]? BEC|BITC|BER|ALL|TBEC|TBIT|TBER|JUDGe`

This query returns the data measurement for the selected variable.

BEC	This choice provides the intermediate bit error count result.
BITC	This choice provides the intermediate bit count result.
BER	This choice provides the intermediate bit error rate result.
ALL	This choice provides the values of the bit error count, bit error rate, and bit count in the following format: <bit count>, <error count>, <bit error rate>
TBEC	This choice provides the total bit error count at the end of each cycle.
TBIT	This choice provides the total bit count at the end of each cycle.
TBER	This choice provides the total bit error rate at the end of each cycle.
JUDGe	This choice provides the pass or fail string.

Input Subsystem–Option UN7 (:INPut:BERT[: BASeband])

:CGATe:DELay:CLOCk

Supported E4438C with Option UN7

```
:INPut:BERT[:BASeband]:CGATe:DELay:CLOCk <val>
:INPut:BERT[:BASeband]:CGATe:DELay:CLOCk?
```

This command sets the number of delay bits for the signal applied to the BER GATE IN rear panel connector.

One bit corresponds with one bit of delay for the input clock.

***RST** 1

Range 1–16384

Key Entry **Gate Clk Delay**

Remarks The gate delay mode must be set to CLOCk for this command to work. Refer to ":CGATe:DELay:MODE". Also, the gate and gate delay must be enabled for this command to work. Refer to ":CGATe[:STATe]" on page 424 and ":CGATe:DELay[:STATe]" on page 423.

:CGATe:DELay:MODE

Supported E4438C with Option UN7

```
:INPut:BERT[:BASeband]:CGATe:DELay:MODE TIME|CLOCk
:INPut:BERT[:BASeband]:CGATe:DELay:MODE:?
```

This command selects the operating mode of the gate delay.

TIME This choice selects the time mode which makes it possible to set the gate time delay in absolute time and the resolution.

CLOCk This choice selects the clock mode which enables you to set the gate delay by a set number of bits.

***RST** TIME

Key Entry **Gate Mode Time Clk**

Remarks The gate state and gate delay state must be enabled for this command to work. Refer to ":CGATe[:STATe]" on page 424 and ":CGATe:DELay[:STATe]" on page 423.

:CGATe:DELay:TIME

Supported E4438C with Option UN7

```
:INPut:BERT[:BASeband]:CGATe:DELay:TIME <val><unit>
:INPut:BERT[:BASeband]:CGATe:DELay:TIME?
```

This command sets the delay time of the gate signal. The gate delay time must be the multiple of the minimum resolution value and if not, the delay resolution is automatically rounded to the nearest multiplied value of the gate time delay value.

The variable <val> is expressed in units of seconds (s), milliseconds (ms), microseconds (µs), and nanoseconds (ns).

***RST** +2.67000000E–008

Range 2.67 ns–1.0 s

Key Entry **Gate Time Delay**

Remarks **Gate Delay Off On** must be set to **On** and **Gate Mode Time Clk** set to **Time** for this command to work. Refer to ":CGATe:DELay[:STATe]" on page 423 and ":CGATe:DELay:MODE" on page 422.

To set the resolution, refer to ":CLOCk:DELAy:RESolution" on page 424.

:CGATe:DELay[:STATe]

Supported E4438C with Option UN7

```
:INPut:BERT[:BASeband]:CGATe:DELay[:STATe] ON|OFF|1|0
:INPut:BERT[:BASeband]:CGATe:DELay[:STATe]?
```

This command enables or disables the operating state of the gate delay.

ON This choice enables the gate delay adjustment function.

OFF This choice disables the gate delay adjustment function.

***RST** 0

Key Entry **Gate Delay Off On**

Remarks The gate must be enabled for this command to work. To enable the gate, refer to ":CGATe[:STATe]" on page 424.

:CGATe:POLarity

Supported E4438C with Option UN7

```
:INPut:BERT[:BASeband]:CGATe:POLarity POSitive|NEGative
:INPut:BERT[:BASeband]:CGATe:POLarity?
```

This command sets the input polarity of the gate signal supplied to the BER GATE IN rear panel connector.

POS With this choice, the signal is valid when the gate signal is high.

NEG With this choice, the signal is valid when the gate signal is low.

***RST** POS

Key Entry **Gate Polarity Neg Pos**

:CGATe[:STATe]

Supported E4438C with Option UN7

```
:INPut:BERT[:BASeband]:CGATe[:STATe] ON|OFF|1|0
:INPut:BERT[:BASeband]:CGATe[:STATe]?
```

This command sets the operating state of the clock gate function.

ON This choice enables the clock gate function.

OFF This choice disables the clock gate function.

***RST** 0

Key Entry **Gate Off On**

:CLOCk:DELAy:RESolution

Supported E4438C with Option UN7

```
:INPut:BERT[:BASeband]:CLOCk:DELay:RESolution <val><unit>
:INPut:BERT[:BASeband]:CLOCk:DELay:RESolution?
```

This command sets the resolution of the clock delay. The minimum resolution is 13.3 ns and it corresponds to 1/75 MHz. The 75 MHz is the sampling clock for the BERT board. The input value must be a multiple of the minimum resolution. If the set value is not a multiple value, the delay resolution is automatically rounded to the nearest multiple value with reference to the set value.

***RST** +1.33000000E–008

Range 13.3ns–80µs

Key Entry **Resolution**

Remarks The clock delay or the gate delay must be enabled for this command to work. Refer to “:CLOCk:DELAy[:STATe]” on page 425 and “:CGATe:DELay[:STATe]” on page 423. A change in the resolution value can affect both the clock and the gate delay time automatically.

:CLOCk:DELAy:TIME

Supported E4438C with Option UN7

```
:INPut:BERT[:BASeband]:CLOCk:DELay:TIME <val><unit>
:INPut:BERT[:BASeband]:CLOCk:DELay:TIME?
```

This command sets the clock signal delay time.

The variable <val> is expressed in units of seconds (s), milliseconds (ms), microseconds (µs), and nanoseconds (ns).

***RST** +2.67000000E–008

Range 26.7ns–999.9967600ms

Key Entry **Clock Time Delay**

Remarks The clock delay must be enabled for this command to work. Refer to “:CLOCk:DELAy[:STATe]” on page 425.

:CLOCk:DELAy[:STATe]

Supported E4438C with Option UN7

```
:INPut:BERT[:BASeband]:CLOCk:DELay[:STATe] ON|OFF|1|0
:INPut:BERT[:BASeband]:CLOCk:DELay[:STATe]?
```

This command sets the operating state of the clock delay function.

ON This choice enables the clock delay adjustment.

OFF This choice disables the clock delay adjustment.

***RST** 0

Key Entry **Clock Delay Off On**

:CLOCk:POLarity

Supported E4438C with Option UN7

```
:INPut:BERT[:BASeband]:CLOCk:POLarity POSitive|NEGative
:INPut:BERT[:BASeband]:CLOCk:POLarity?
```

This command sets the input polarity of the clock signal supplied to the BER CLK IN rear panel connector.

POS With this choice, the signal is valid when the clock signal is high.

NEG With this choice, the signal is valid when the clock signal is low.

***RST** POS

Key Entry **Clock Polarity Neg Pos**

:DATA:POLarity

Supported E4438C with Option UN7

```
:INPut:BERT[:BASeband]:DATA:POLarity POSitive|NEGative
:INPut:BERT[:BASeband]:DATA:POLarity?
```

This command sets the input polarity of the data signal supplied to the BER DATA IN rear panel connector.

POS With this choice, the signal is valid when the data signal is high.

NEG With this choice, the signal is valid when the data signal is low.

***RST** POS

Key Entry **Data Polarity Neg Pos**

:IMPedance

Supported E4438C with Option UN7

```
:INPut:BERT[:BASeband]:IMPedance OHM_75|HIGH
:INPut:BERT[:BASeband]:IMPedance?
```

This command sets the input termination mode of the BER CLK IN, BER DATA IN, and BER GATE IN rear panel connectors.

***RST** HIGH

Key Entry **Impedance 75 Ohm High**

:THReshold

Supported E4438C with Option UN7

```
:INPut:BERT[:BASeband]:THReshold V0_7|V1_4|V1_65|V2_5
:INPut:BERT[:BASeband]:THReshold?
```

This command sets the threshold voltage level of the BER CLK IN, BER DATA IN, and BER GATE IN rear panel connectors.

V0_7 This choice selects 0.7 volts (normal TTL) as the turn-on voltage for the input signal.

V1_4 This choice selects 1.4 volts (Schmit TTL) as the turn-on voltage for the input signal.

V1_65 This choice selects 1.65 volts (CMOS 3.3 volts is the maximum operating range) as the turn-on voltage for the input signal.

V2_5 This choice selects 2.5 volts (CMOS 5 volts is the maximum operating range) as the turn-on voltage for the input signal.

***RST** V1_4

Key Entry **0.7V** **1.4V** **1.65V** **2.5V**

Measure Subsystem–Option 300 (:MEASure[:SCALar]:BERT:BTS:LOOPback)

:EDGE:MCS5[:SENSitivity]

Supported E4438C with Option 300

```
:MEASure[:SCALAR]:BERT:BTS:LOOPback:EDGE:MCS5[:SENSitivity]?
<high amplitude><unit>,<low amplitude><unit>,<pass amplitude><unit>,
<error sensitivity limit>,<block count>,<initial block count>
```

This query returns either PASS or FAIL and the result for the measured sensitivity level. When this command is executed before the signal generator is synchronized with the BTS, the message "`Fail, –999.00`" is displayed.

There are two other status errors that may be returned; `SERR` or `DERR`.

`SERR` This indicates that RF synchronization is lost during search and the search is aborted.

`DERR` This indicates that a downlink error occurred during search and the search is aborted.

When these errors are returned, the sensitivity search returns a value of –1.0.

This command can be used in both the BER% measurement or the sensitivity search mode. After this command is executed, the measurement mode is in the sensitivity search mode.

Remarks The trigger source must be set to IMMediate to execute this command. If the trigger source selection is BUS, error "-214 Trigger deadlock" is generated and no data is returned.

:EDGE:MCS9[:SENSitivity]

Supported E4438C with Option 300

```
:MEASure[:SCALAR]:BERT:BTS:LOOPback:EDGE:MCS9[:SENSitivity]?
<high amplitude><unit>,<low amplitude><unit>,<pass amplitude><unit>,
<error sensitivity limit>,block count>,<initial block count>
```

This query returns either PASS or FAIL and the result for the measured sensitivity level. When this command is executed before the signal generator is synchronized with the BTS, the message "`Fail, –999.00`" is displayed.

There are two other status errors that may be returned; SERR or DERR.

SERR This indicates that RF synchronization is lost during search and the search is aborted.

DERR This indicates that a downlink error occurred during search and the search is aborted.

When these errors are returned, the sensitivity search returns a value of –1.0.

This command can be used in both the BER% measurement or the sensitivity search mode. After this command is executed, the measurement mode is in the sensitivity search mode.

Remarks The trigger source must be set to IMMediate to execute this command. If the trigger source selection is BUS, error "-214 Trigger deadlock" is generated and no data is returned.

:EDGE:UNCoded[:SENSitivity]

Supported E4438C with Option 300

```
:MEASure[:SCALAR]:BERT:BTS:LOOPback:EDGE:UNCoded[:SENSitivity]?
<high amplitude><unit>,<low amplitude><unit>,<pass amplitude><unit>,
<error sensitivity limit>,<block count>,<initial block count>
```

This query returns either PASS or FAIL and the result for the measured sensitivity level. When this command is executed before the signal generator is synchronized with the BTS, the message "Fail, –999.00" is displayed.

There are two other status errors that may be returned; SERR or DERR.

SERR This indicates that RF synchronization is lost during search and the search is aborted.

DERR This indicates that a downlink error occurred during search and the search is aborted.

When these errors are returned, the sensitivity search returns a value of –1.0.

This command can be used in both the BER% measurement or the sensitivity search mode. After this command is executed, the measurement mode is in the sensitivity search mode.

Remarks The trigger source must be set to IMMediate to execute this command. If the trigger source selection is BUS, error "-214 Trigger deadlock" is generated and no data is returned.

:GSM[:SENSitivity]

Supported E4438C with Option 300

```
:MEASure[:SCALAR]:BERT:BTS:LOOPback:GSM[:SENSitivity]?
<high amplitude><unit>,<low amplitude><unit>,<pass amplitude><unit>,
<error sensitivity limit>,<block count>,<initial block count>
```

This query returns either PASS or FAIL and the result for the measured sensitivity level. When this command is executed before the signal generator is synchronized with the BTS, the message “`Fail, –999.00`” is displayed.

There are two other status errors that may be returned; `SERR` or `DERR`.

`SERR` This indicates that RF synchronization is lost during search and the search is aborted.

`DERR` This indicates that a downlink error occurred during search and the search is aborted.

When these errors are returned, the sensitivity search returns a value of –1.0.

This command can be used in both the BER% measurement or the sensitivity search mode. After this command is executed, the measurement mode is in the sensitivity search mode.

Remarks The trigger source must be set to IMMediate to execute this command. If the trigger source selection is BUS, error “-214 Trigger deadlock” is generated and no data is returned.

Sense Subsystem–Options UN7 and 300 ([:SOURce]:SENSe:BERT)

:BTS:LOOPback:EDGE:ETCH:F43:BLOCk:COUNt

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:ETCH:F43:BLOCk:COUNt <val>
:SENSe:BERT:BTS:LOOPback:EDGE:ETCH:F43:BLOCk:COUNt?
```

This command specifies the total number of blocks to be measured.

***RST** +600

Range 1–1500000

Key Entry **Block Count**

:BTS:LOOPback:EDGE:ETCH:F43:CONTain

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:ETCH:F43:CONTain ON|OFF|1|0
:SENSe:BERT:BTS:LOOPback:EDGE:ETCH:F43:CONTain?
```

This command enables or disables the BER measurement for ETCH/F43 channels in addition to the BLER measurement.

ON With this choice, data bits of the specified number of blocks are measured.

OFF This choice disables the measurement.

***RST** 1

Key Entry **BER Mode Off On**

:BTS:LOOPback:EDGE:ETCH:F43:STOP:CRITeria:EBLock

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:ETCH:F43:STOP:CRITeria:EBLock <val>
:SENSe:BERT:BTS:LOOPback:EDGE:ETCH:F43:STOP:CRITeria:EBLock?
```

This command specifies the number of erased blocks that contain bit errors for the threshold limit to stop the measurement.

***RST** +60

Range 0–1500000

Key Entry **Block Erasure**

:BTS:LOOPback:EDGE:ETCH:F43:STOP:CRITeria[:SELect]

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:ETCH:F43:STOP:CRITeria[:SELect] EBLock|
NONE
:SENSe:BERT:BTS:LOOPback:EDGE:ETCH:F43:STOP:CRITeria[:SELect]?
```

This command determines which of the following threshold criteria is used to prematurely stop the measurement prior to the normal measurement end. In each case, the measurement will terminate no later than 200 ms after the threshold is exceeded.

EBLock This choice enables you to specify the number of erased blocks.

NONE This choice disables the stop measurement threshold criteria function.

***RST** NONE

Key Entry **Block Erasure** **No Thresholds**

:BTS:LOOPback:EDGE:FTRigger:EXTernal:DELay

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:FTRigger:EXTernal:DELay <val>
:SENSe:BERT:BTS:LOOPback:EDGE:FTRigger:EXTernal:DELay?
```

This command specifies the delay time of the external frame trigger. This delay is the offset from the beginning of timeslot 0.

The variable <val> is expressed in symbols with a resolution of 0.25.

***RST** +0.00000000E+000

Range –1250 to 1250

Key Entry **Ext Frame Trigger Delay**

Remarks Refer to the *E4428C/38C ESG Signal Generators User's Guide* for information on how to calculate the delay value.

:BTS:LOOPback:EDGE:FTRigger:EXTernal:POLarity

Supported E4438C with Option 300

:SENSe:BERT:BTS:LOOPback:EDGE:FTRigger:EXTernal:POLarity POSitive|
NEGative
:SENSe:BERT:BTS:LOOPback:EDGE:FTRigger:EXTernal:POLarity?

This command specifies the external frame trigger polarity.

POS This selects the reference edge to be the rising edge of the pulse.

NEG This selects the reference edge to be the falling edge of the pulse.

***RST** POS

Key Entry **External Frame Trigger Polarity Neg Pos**

:BTS:LOOPback:EDGE:FTRigger[SELect]

Supported E4438C with Option 300

:SENSe:BERT:BTS:LOOPback:EDGE:FTRigger[:SELect] INTernal|EXTernal
:SENSe:BERT:BTS:LOOPback:EDGE:FTRigger[:SELect]?

This command specifies the frame trigger source to be used by the baseband generator.

INTernal This choice enables internal triggering.

EXTernal This choice enables the triggering by an externally applied signal at the rear panel connector.

***RST** INT

Key Entry Frame Trigger Source Int Ext

Remarks To enable this command, the frame trigger synchronization source must be PDCH. Refer to ":BTS:LOOPback:EDGE:SYNC[:SOURce]" on page 444.

:BTS:LOOPback:EDGE:MCS5:BLOCk:COUNt

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MCS5:BLOCk:COUNt <value>
:SENSe:BERT:BTS:LOOPback:EDGE:MCS5:BLOCk:COUNt?
```

This command specifies the total number of blocks to be measured.

***RST** +600

Range 1–1500000

Key Entry **Block Count**

:BTS:LOOPback:EDGE:MCS5:CONTain

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MCS5:CONTain ON|OFF|1|0
:SENSe:BERT:BTS:LOOPback:EDGE:MCS5:CONTain?
```

This command enables or disables the BER measurement for MCS-5 channels in addition to the BLER measurement.

ON	With this choice, data bits of the specified number of blocks are measured.
OFF	This choice disables the measurement.
***RST**	1
Key Entry	**BER Mode Off On**

:BTS:LOOPback:EDGE:MCS5:ESENsitivity

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MCS5:ESENsitivity <val>
:SENSe:BERT:BTS:LOOPback:EDGE:MCS5:ESENsitivity?
```

This command specifies the target error rate when performing a sensitivity search.

The variable <val> is a decimal notation representing a percentage value.

***RST**	+1.00000000E–001
Range	1E–6 to 1
Key Entry	**Target BER %**

:BTS:LOOPback:EDGE:MCS5:HAMPlitude

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MCS5:HAMPlitude <val>
:SENSe:BERT:BTS:LOOPback:EDGE:MCS5:HAMPlitude?
```

This command specifies the maximum amplitude level for performing a sensitivity search. The high amplitude value can not be lower than the low amplitude value.

The variable <val> is expressed in units of dBm.

***RST**	–9.00000000E+001
Range	–136 to 20
Key Entry	**High Amplitude**

:BTS:LOOPback:EDGE:MCS5:LAMPlitude

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MCS5:LAMPlitude <val>
:SENSe:BERT:BTS:LOOPback:EDGE:MCS5:LAMPlitude?
```

This command specifies the minimum amplitude level for performing a sensitivity search. The low amplitude value can not be higher than the high amplitude value.

The variable <val> is expressed in units of dBm.

***RST** –1.10000000E+002

Range –136.0 to 20

Key Entry **Low Amplitude**

:BTS:LOOPback:EDGE:MCS5:PAMPlitude

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MCS5:PAMPlitude <val>
:SENSe:BERT:BTS:LOOPback:EDGE:MCS5:PAMPlitude?
```

This command specifies the threshold amplitude for pass/fail comparator results when performing a sensitivity search.

The variable <val> is expressed in units of dBm.

***RST** –1.01000000E+002

Range –136.0 to 20

Key Entry **Pass Amplitude**

:BTS:LOOPback:EDGE:MCS5:SBLock:COUNt

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MCS5:SBLock:COUNt <val>
:SENSe:BERT:BTS:LOOPback:EDGE:MCS5:SBLock:COUNt?
```

This command specifies the total number of blocks for each measurement during the sensitivity search.

***RST** +1200

Range 1–1500000

Key Entry **Block Count**

:BTS:LOOPback:EDGE:MCS5:SBLock:INITial

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MCS5:SBLock:INITial <val>
:SENSe:BERT:BTS:LOOPback:EDGE:MCS5:SBLock:INITial?
```

This command specifies the total number of blocks to be measured at the beginning of each measurement during the sensitivity search.

***RST** +600

Range 1–1500000

Key Entry **Initial Block Count**

:BTS:LOOPback:EDGE:MCS5:STOP:CRITeria:EBLock

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MCS5:STOP:CRITeria:EBLock <val>
:SENSe:BERT:BTS:LOOPback:EDGE:MCS5:STOP:CRITeria:EBLock?
```

This command specifies the number of erased blocks that contain bit errors for the threshold limit to stop the measurement.

***RST** +60

Range 0–1500000

Key Entry **Block Erasure**

:BTS:LOOPback:EDGE:MCS5:STOP:CRITeria[:SELect]

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MCS5:STOP:CRITeria[:SELect] EBLock|NONE
:SENSe:BERT:BTS:LOOPback:EDGE:MCS5:STOP:CRITeria[:SELect]?
```

This command determines which of the following threshold criteria is used to prematurely stop the measurement prior to the normal measurement end. In each case, the measurement will terminate no later than 200 ms after the threshold is exceeded.

EBLock This choice enables you to specify the number of erased blocks or bit errors.

NONE This choice disables the stop measurement threshold criteria function.

Key Entry **Block Erasure** **No Thresholds**

:BTS:LOOPback:EDGE:MCS9:BLOCk:COUNt

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MCS9:BLOCk:COUNt <val>
:SENSe:BERT:BTS:LOOPback:EDGE:MCS9:BLOCk:COUNt?
```

This command specifies the total number of blocks to be measured.

Only even values can be entered. If odd numbers are entered, the value increments by one to make it an even value.

***RST** +600

Range 2–1500000

Key Entry **Block Count**

:BTS:LOOPback:EDGE:MCS9:CONTain

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MCS9:CONTain ON|OFF|1|0
:SENSe:BERT:BTS:LOOPback:EDGE:MCS9:CONTain?
```

This command enables or disables the BER measurement for MCS-9 channels in addition to the BLER measurement.

ON With this choice, data bits of the specified number of blocks are measured.

OFF This choice disables the measurement.

***RST** 1

Key Entry **BER Mode Off On**

:BTS:LOOPback:EDGE:MCS9:ESENsitivity

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MCS9:ESENsitivity <val>
:SENSe:BERT:BTS:LOOPback:EDGE:MCS9:ESENsitivity?
```

The variable <val> is a decimal notation representing a percentage value.

***RST** +1.00000000E-001

Range 1E–6 to 1

Key Entry **Target BER %**

:BTS:LOOPback:EDGE:MCS9:HAMPlitude

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MCS9:HAMPlitude <val>
:SENSe:BERT:BTS:LOOPback:EDGE:MCS9:HAMPlitude?
```

This command specifies the maximum amplitude level for performing a sensitivity search. The high amplitude value can not be lower than the low amplitude value.

The variable <val> is expressed in units of dBm.

***RST** –8.00000000E+001

Range –136.0 to 20

Key Entry **High Amplitude**

:BTS:LOOPback:EDGE:MCS9:LAMPlitude

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MCS9:LAMPlitude <val>
:SENSe:BERT:BTS:LOOPback:EDGE:MCS9:LAMPlitude?
```

This command specifies the minimum amplitude level for performing a sensitivity search. The low amplitude value can not be higher than the high amplitude value.

The variable <val> is expressed in units of dBm.

***RST** –1.00000000E+002

Range –136.0 to 20

Key Entry **Low Amplitude**

:BTS:LOOPback:EDGE:MCS9:PAMPlitude

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MCS9:PAMPlitude <val>
:SENSe:BERT:BTS:LOOPback:EDGE:MCS9:PAMPlitude?
```

This command specifies the threshold amplitude for pass/fail comparator results when performing a sensitivity search.

The variable <val> is expressed in units of dBm.

***RST** –9.15000000E+001

Range –136.0 to 20

Key Entry **Pass Amplitude**

:BTS:LOOPback:EDGE:MCS9:SBLock:COUNt

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MCS9:SBLock:COUNt <val>
:SENSe:BERT:BTS:LOOPback:EDGE:MCS9:SBLock:COUNt?
```

This command specifies the total number of blocks to be measured at each measurement during the sensitivity search.

Only even values can be entered. If odd numbers are entered, the value increments by one to make it an even value.

***RST** +1200

Range 2–1500000

Key Entry **Block Count**

:BTS:LOOPback:EDGE:MCS9:SBLock:INITial

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MCS9:SBLock:INITial <val>
:SENSe:BERT:BTS:LOOPback:EDGE:MCS9:SBLock:INITial?
```

This command specifies the total number of blocks to be measured at the beginning of each measurement during the sensitivity search.

Only even values can be entered. If odd numbers are entered, the value increments by one to make it an even value.

***RST** +600

Range 2–1500000

Key Entry **Initial Block Count**

:BTS:LOOPback:EDGE:MCS9:STOP:CRITeria:EBLock

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MCS9:STOP:CRITeria:EBLock <val>
:SENSe:BERT:BTS:LOOPback:EDGE:MCS9:STOP:CRITeria:EBLock?
```

This command specifies the number of erased blocks that contain bit errors for the threshold limit to stop the measurement.

***RST** +60

Range 0–1500000

Key Entry **Block Erasure**

:BTS:LOOPback:EDGE:MCS9:STOP:CRITeria[:SELect]

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MCS9:STOP:CRITeria[:SELect] EBLock|NONE
:SENSe:BERT:BTS:LOOPback:EDGE:MCS9:STOP:CRITeria[:SELect]?
```

This command determines which of the following threshold criteria is used to prematurely stop the measurement prior to the normal measurement end. In each case, the measurement will terminate no later than 200 ms after the threshold is exceeded.

EBLock This choice enables you to specify the number of non-erased blocks that contain bit errors.

NONE This choice disables the stop measurement threshold criteria function.

***RST** NONE

Key Entry **Block Erasure** **No Thresholds**

:BTS:LOOPback:EDGE:MEASurement:STOP

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MEASurement:STOP
```

This command immediately stops any current measurement and releases the PRBS synchronization. After the synchronization is released, a new PRBS synchronization is attempted.

Key Entry **Stop Measurement**

:BTS:LOOPback:EDGE:MEASurement:TSLot

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MEASurement:TSLot 0|1|2|3|4|5|6|7
:SENSe:BERT:BTS:LOOPback:EDGE:MEASurement:TSLot?
```

This command specifies the timeslot number in which the measurement is to be performed.

The following EDGE timeslot configuration conditions will generate error message "-221 Settings Conflict":

- If the specified timeslot does not have one of the BLER/BER measurable channel types, which are uncoded, E-TCH/43.2NT, MCS-9, and MCS-5.
- If the specified timeslot type is not set to "NORMal."

***RST** +0

Key Entry **Timeslot**

Remarks This command couples the selected timeslot number with the EDGE configuration.

Changing the timeslot configuration with EDGE on will not generate an error message if EDGE BERT is off and the timeslot is off.

:BTS:LOOPback:EDGE:MEASurement[:MODE]

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:MEASurement[:MODE] BLER|SSEarch
:SENSe:BERT:BTS:LOOPback:EDGE:MEASurement[:MODE]?
```

This command specifies the measurement mode.

BLER This choice specifies BLER% as the measurement mode.

SSEarch This choice specifies sensitivity search as the measurement mode.

***RST** BLER

Key Entry **Measurement Mode BLER% Search**

Remarks If the BLER% measurement is already running, this command will abort the BLER% measurement.

:BTS:LOOPback:EDGE:SINVert

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:SINVert ON|OFF|1|0
:SENSe:BERT:BTS:LOOPback:EDGE:SINVert?
```

This command sets the operating state of the spectrum inverting function.

ON This choice specifies that the EDGE demodulator invert the spectrum of the received RF signal.

OFF This choice leaves the spectrum of the received RF signal unaffected.

***RST** 1

Key Entry **Spectrum Invert Off On**

:BTS:LOOPback:EDGE:SYNC:AGAin

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:SYNC:AGAin
```

This command adjusts the input signal level of the internal demodulator. Use this adjustment when switching from BCH synchronization to PDCH synchronization.

Key Entry **Adjust Gain**

Remarks This command is ignored unless the status displays "Waiting for PDCH."

:BTS:LOOPback:EDGE:SYNC:RF

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:SYNC:RF
```

This command releases the current synchronization with the BTS and immediately starts to try to synchronize to either a BCH or PDCH signal as selected with the `SYNC[:SOURce]` command. This command will also stop the current measurement.

Key Entry **Synchronize to BCH/PDCH**

:BTS:LOOPback:EDGE:SYNC[:SOURce]

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:SYNC[:SOURce] BCH|PDCH
:SENSe:BERT:BTS:LOOPback:EDGE:SYNC[:SOURce]?
```

This command specifies the synchronization source from the BTS under test.

BCH	This choice specifies the traffic channel as the synchronization source.
PDCH	This choice specifies the packet data channel as the synchronization source.
***RST**	BCH
Key Entry	**Sync Source BCH PDCH**

:BTS:LOOPback:EDGE:TRIGger[:SOURce]

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:TRIGger[:SOURce] IMMediate|KEY|EXT|BUS
:SENSe:BERT:BTS:LOOPback:EDGE:TRIGger[:SOURce]?
```

This command determines the trigger source for the EDGE loopback bit error rate measurement.

IMMediate	This choice begins the measurement directly after synchronization has been achieved.
KEY	This choice begins the measurement when the front panel **Trigger** key is pressed, provided that synchronization has been achieved. If synchronization has not occurred, the trigger is ignored.
EXT	This choice begins the measurement as soon as a trigger signal is applied to the rear panel connector provided that synchronization has been achieved. If synchronization has not occurred, the trigger is ignored.
BUS	This choice enables GPIB triggering using the *TRG or GET command or LAN and RS-232 triggering using the *TRG command.
***RST**	KEY
Key Entry	**Immediate** **Trigger Key** **Ext** **Bus**
Remarks	An inherent variable delay will always exist when starting a measurement because the measurement must await the start of the next speech frame after the trigger. The delay can vary between 0 and 23 ms (5 frames) depending on where the trigger falls within the TDMA multiframe. A trigger is ignored unless the EDGE loopback operating state is turned on.

:BTS:LOOPback:EDGE:ULINk:OFFSet

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:ULINk:OFFSet <val>
:SENSe:BERT:BTS:LOOPback:EDGE:ULINk:OFFSet?
```

This command specifies, in symbols, the amount of compensation for the insertion of equipment such as fading simulators into the uplink RF path.

***RST** +0

Range –500 to 10000

Key Entry **Uplink Timing Advance**

:BTS:LOOPback:EDGE:UNCoded:BIT:COUNt

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:UNCoded:BIT:COUNt <value>
:SENSe:BERT:BTS:LOOPback:EDGE:UNCoded:BIT:COUNt?
```

This command specifies the total number of bits to be measured for the uncoded channel.

***RST** +139200

Range 1392–2147483647

Key Entry **Bit Count**

:BTS:LOOPback:EDGE:UNCoded:ESENsitivity

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:UNCoded:ESENsitivity <val>
:SENSe:BERT:BTS:LOOPback:EDGE:UNCoded:ESENsitivity?
```

This command specifies the target error rate when performing a sensitivity search.

***RST** +2.00000000E-002

Range 1E–6 to 1

Key Entry **Target BER %**

:BTS:LOOPback:EDGE:UNCoded:HAMPlitude

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:UNCoded:HAMPlitude <val>
:SENSe:BERT:BTS:LOOPback:EDGE:UNCoded:HAMPlitude?
```

This command specifies the maximum amplitude level for performing a sensitivity search. The high amplitude value can not be lower than the low amplitude value.

The variable <val> is expressed in units of dBm.

***RST** –8.50000000E+001

Range –136.0 to 20

Key Entry **High Amplitude**

:BTS:LOOPback:EDGE:UNCoded:LAMPlitude

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:UNCoded:LAMPlitude <val>
:SENSe:BERT:BTS:LOOPback:EDGE:UNCoded:LAMPlitude?
```

This command specifies the minimum amplitude level for performing a sensitivity search. The low amplitude value can not be higher than the high amplitude value.

The variable <val> is expressed in units of dBm.

***RST** –1.05000000E+002

Range –136.0 to 20

Key Entry **Low Amplitude**

:BTS:LOOPback:EDGE:UNCoded:PAMPlitude

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:UNCoded:PAMPlitude <val>
:SENSe:BERT:BTS:LOOPback:EDGE:UNCoded:PAMPlitude?
```

This command specifies the threshold amplitude for pass/fail comparator results when performing a sensitivity search.

The variable <val> is expressed in units of dBm.

***RST** –9.50000000E+001

Range –136.0 to 20

Key Entry **Pass Amplitude**

:BTS:LOOPback:EDGE:UNCoded:SBIT:COUNt

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:UNCoded:SBIT:COUNt <val>
:SENSe:BERT:BTS:LOOPback:EDGE:UNCoded:SBIT:COUNt?
```

This command specifies the total number of bits to be measured during a sensitivity search for the uncoded channel.

***RST** +139200

Range 1392–2147483647

Key Entry **Bit Count**

:BTS:LOOPback:EDGE:UNCoded:SBIT:INITial

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:UNCoded:SBIT:INITial <val>
:SENSe:BERT:BTS:LOOPback:EDGE:UNCoded:SBIT:INITial?
```

This command specifies the total number of bits to be measured at the beginning of the sensitivity search for the uncoded channel.

***RST** +13920

Range 1392–2147483647

Key Entry **Initial Bit Count**

:BTS:LOOPback:EDGE:UNCoded:STOP:CRITeria:EBIT

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:UNCoded:STOP:CRITeria:EBIT <val>
:SENSe:BERT:BTS:LOOPback:EDGE:UNCoded:STOP:CRITeria:EBIT?
```

This command specifies the number of block erasures or bit errors, depending on the measurement channel type, for the threshold limit to stop the measurement.

***RST** +2784

Range 0–2147483647

Key Entry **Error Count**

:BTS:LOOPback:EDGE:UNCoded:STOP:CRITeria[:SELect]

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE:UNCoded:STOP:CRITeria[:SELect] EBIT|NONE
:SENSe:BERT:BTS:LOOPback:EDGE:UNCoded:STOP:CRITeria[:SELect]?
```

This command determines which of the following threshold criteria is used to prematurely stop the measurement prior to the normal measurement end. In each case, the measurement will terminate no later than 200 ms after the threshold is exceeded.

EBIT This choice enables you to specify the number of bit errors.

NONE This choice disables the stop measurement threshold criteria function.

***RST** NONE

Key Entry **Error Count** **No Thresholds**

:BTS:LOOPback:EDGE[:STATe]

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:EDGE[:STATe] ON|OFF|1|0
:SENSe:BERT:BTS:LOOPback:EDGE[:STATe]?
```

This command sets the operating state of the EDGE loopback bit error rate (BER) function.

ON This choice enables the EDGE loopback BER function.

OFF This choice disables the EDGE loopback BER function.

***RST** 0

Key Entry **EDGE BERT Off On**

Remarks Although you can configure the measurement parameters while the operating state is off, any command triggers sent will be ignored until the operating state is turned on.

:BTS:LOOPback:GSM:CS1:BLOCk:COUNt

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:CS1:BLOCk:COUNt <val>
:SENSe:BERT:BTS:LOOPback:GSM:CS1:BLOCk:COUNt?
```

This command specifies the total number of blocks to be measured.

***RST** +600

Range 1–1500000

Key Entry **Block Count**

:BTS:LOOPback:GSM:CS1:CONTain

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:CS1:CONTain ON|OFF|1|0
:SENSe:BERT:BTS:LOOPback:GSM:CS1:CONTain?
```

This command enables or disables the BER measurement for CS-1 channels in addition to the BLER measurement.

ON With this choice, data bits of the specified number of blocks are measured.

OFF This choice disables the BER measurement.

***RST** 1

Key Entry **BER Mode Off On**

:BTS:LOOPback:GSM:CS1:STOP:CRITeria:EBLock

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:CS1:STOP:CRITeria:EBLock <val>
:SENSe:BERT:BTS:LOOPback:GSM:CS1:STOP:CRITeria:EBLock?
```

This command specifies the number of erased blocks that contain bit errors for the threshold limit to stop the measurement.

***RST** +60

Range 0–1500000

Key Entry **Block Erasure**

:BTS:LOOPback:GSM:CS1:STOP:CRITeria[:SELect]

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:CS1:STOP:CRITeria[:SELect] EBLock|NONE
:SENSe:BERT:BTS:LOOPback:GSM:CS1:STOP:CRITeria[:SELect]?
```

This command determines which of the following threshold criteria is used to prematurely stop the measurement prior to the normal measurement end. In each case, the measurement will terminate no later than 200 ms after the threshold is exceeded.

EBLock This choice enables you to specify the number of erased blocks.

NONE This choice disables the stop measurement threshold criteria function.

***RST** NONE

Key Entry **Block Erasure** **No Thresholds**

:BTS:LOOPback:GSM:CS4:BLOCk:COUNt

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:CS4:BLOCk:COUNt <value>
:SENSe:BERT:BTS:LOOPback:GSM:CS4:BLOCk:COUNt?
```

This command specifies the total number of blocks to be measured.

***RST** +600

Range 1 to 1500000

Key Entry **Block Count**

:BTS:LOOPback:GSM:CS4:CONTain

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:CS4:CONTain ON|OFF|1|0
:SENSe:BERT:BTS:LOOPback:GSM:CS4:CONTain?
```

This command enables or disables the BER measurement for CS-4 channels in addition to the BLER measurement.

ON	With this choice, data bits of the specified number of blocks are measured.
OFF	This choice disables the BER measurement.
***RST**	1
Key Entry	**BER Mode Off On**

:BTS:LOOPback:GSM:CS4:STOP:CRITeria:EBLock

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:CS4:STOP:CRITeria:EBLock <val>
:SENSe:BERT:BTS:LOOPback:GSM:CS4:STOP:CRITeria:EBLock?
```

This command specifies the threshold limit to stop the measurement which is the number of erased blocks that contain bit errors.

***RST**	+60
Range	0–1500000
Key Entry	**Block Erasure**

:BTS:LOOPback:GSM:CS4:STOP:CRITeria[:SELect]

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:CS4:STOP:CRITeria[:SELect] EBLock|NONE
:SENSe:BERT:BTS:LOOPback:GSM:CS4:STOP:CRITeria[:SELect]?
```

This command determines which of the following threshold criteria is used to prematurely stop the measurement prior to the normal measurement end. In each case, the measurement will terminate no later than 200 ms after the threshold is exceeded.

EBLock This choice enables you to specify the number of erased blocks.

NONE This choice disables the stop measurement threshold criteria function.

***RST** NONE

Key Entry **Block Erasure** **No Thresholds**

:BTS:LOOPback:GSM:ESENsitivity

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:ESENsitivity <val>
:SENSe:BERT:BTS:LOOPback:GSM:ESENsitivity?
```

This command specifies the target error rate when performing a sensitivity search.

***RST** +2.00000000E-002

Range 1E–6 to 1

Key Entry **Target BER%**

:BTS:LOOPback:GSM:FRAMe:CIB

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:FRAMe:CIB?
```

This query returns the total number of Class Ib bits to be measured which are calculated from the total number of frames specified to be measured.

:BTS:LOOPback:GSM:FRAMe:CII

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:FRAMe:CII?
```

This query returns the total number of Class II bits to be measured which are calculated from the total number of frames specified to be measured.

:BTS:LOOPback:GSM:FRAMe:COUNt

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:FRAMe:COUNt <val>
:SENSe:BERT:BTS:LOOPback:GSM:FRAMe:COUNt?
```

This command determines the length of the measurement specified by the total number of frames included in one measurement.

***RST** +100

Range 1–6000000

Key Entry **Frame Count**

:BTS:LOOPback:GSM:HAMPlitude

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:HAMPlitude <val>
:SENSe:BERT:BTS:LOOPback:GSM:HAMPlitude?
```

This command specifies the maximum amplitude level for performing a sensitivity search.

The variable <val> is expressed in units of dBm.

***RST** –9.00000000E+001

Range –136.0 to 20

Key Entry **High Amplitude**

:BTS:LOOPback:GSM:LAMPlitude

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:LAMPlitude <val>
:SENSe:BERT:BTS:LOOPback:GSM:LAMPlitude?
```

This command specifies the minimum amplitude level for performing a sensitivity search.

The variable <val> is expressed in units of dBm.

***RST** –1.15000000E+002

Range –136.0 to 20

Key Entry **Low Amplitude**

:BTS:LOOPback:GSM:MCS1:BLOCk:COUNt

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:MCS1:BLOCk:COUNt <val>
:SENSe:BERT:BTS:LOOPback:GSM:MCS1:BLOCk:COUNt?
```

This command specifies the total number of blocks to be measured.

***RST** +600

Range 1–1500000

Key Entry **Block Count**

:BTS:LOOPback:GSM:MCS1:CONTain

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:MCS1:CONTain ON|OFF|1|0
:SENSe:BERT:BTS:LOOPback:GSM:MCS1:CONTain?
```

This command enables or disables the BER measurement for MCS-1 channels in addition to the BLER measurement.

ON With this choice, data bits of the specified number of blocks are measured.

OFF This choice disables the BER measurement.

***RST** 1

Key Entry **BER Mode Off On**

:BTS:LOOPback:GSM:MCS1:STOP:CRITeria:EBLock

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:MCS1:STOP:CRITeria:EBLock <val>
:SENSe:BERT:BTS:LOOPback:GSM:MCS1:STOP:CRITeria:EBLock?
```

This command specifies the number of erased blocks that contain bit errors for the threshold limit to stop the measurement.

***RST** +60

Range 0–1500000

Key Entry **Block Erasure**

:BTS:LOOPback:GSM:MCS1:STOP:CRITeria[:SELect]

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:MCS1:STOP:CRITeria[:SELect] EBLock|NONE
:SENSe:BERT:BTS:LOOPback:GSM:MCS1:STOP:CRITeria[:SELect]?
```

This command determines which of the following threshold criteria is used to prematurely stop the measurement prior to the normal measurement end. In each case, the measurement will terminate no later than 200 ms after the threshold is exceeded.

EBLock This choice enables you to specify the number of erased blocks.

NONE This choice disables the stop measurement threshold criteria function.

***RST** NONE

Key Entry **Block Erasure** **No Thresholds**

:BTS:LOOPback:GSM:MEASurement:STOP

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:MEASurement:STOP
```

This command stops any current measurement and releases the current PRBS synchronization. After the synchronization is released, a new PRBS synchronization is attempted.

Key Entry **Stop Measurement**

:BTS:LOOPback:GSM:MEASurement:TSLot

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:MEASurement:TSLot 0|1|2|3|4|5|6|7
```
:SENSe:BERT:BTS:LOOPback:GSM:MEASurement:TSLot?

This command specifies the timeslot number in which the measurement is to be performed. This command couples the selected timeslot number with the GSM configuration.

The following GSM timeslot configuration conditions will generate error message “-221 Settings Conflict”:

- If the specified timeslot E field fails to designate either MPN9 or MPN15.
- If the specified timeslot is not set to “Normal.”

***RST** +0

Key Entry **Timeslot**

Remarks Changing the timeslot configuration with GSM on will not generate error messages if GSM BERT is off and the timeslot is off.

:BTS:LOOPback:GSM:MEASurement[:MODE]

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:MEASurement[:MODE] BER|SSEarch
:SENSe:BERT:BTS:LOOPback:GSM:MEASurement[:MODE]?
```

This command specifies the measurement mode.

BER This choice specifies BER% as the measurement mode.

SSEarch This choice specifies sensitivity search as the measurement mode.

***RST** BER

Key Entry **Measurement Mode BER% Search**

Remarks If the BER% measurement is already running, this command will abort the BER% measurement.

:BTS:LOOPback:GSM:PAMPlitude

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:PAMPlitude <val>
:SENSe:BERT:BTS:LOOPback:GSM:PAMPlitude?
```

This command specifies the threshold amplitude for pass/fail comparator results when performing a sensitivity search.

The variable <val> is expressed in units of dBm.

***RST** –1.04000000E+002

Range –136.0 to 20

Key Entry **Pass Amplitude**

:BTS:LOOPback:GSM:SFRame:COUNt

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:SFRame:COUNt <val>
:SENSe:BERT:BTS:LOOPback:GSM:SFRame:COUNt?
```

This command specifies the total number of frames to be measured for the final measurements during the sensitivity search.

***RST** +100

Range 1–6000000

Key Entry Frame Count

:BTS:LOOPback:GSM:SFRame:INITial

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:SFRame:INITial <val>
:SENSe:BERT:BTS:LOOPback:GSM:SFRame:INITial?
```

This command specifies the number of frames to be measured while sensitivity search is running rough searching to gain search speed. It is the first phase of sensitivity search.

***RST** +26

Range 1–6000000

Key Entry **Initial Frame Count**

:BTS:LOOPback:GSM:SINVert

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:SINVert ON|OFF|1|0
:SENSe:BERT:BTS:LOOPback:GSM:SINVert?
```

This command sets the operating state of the spectrum inverting function.

ON This choice specifies that the GSM demodulator invert the spectrum of the received RF signal.

OFF This choice leaves the spectrum of the received RF signal unaffected.

***RST** 1

Key Entry **Spectrum Invert Off On**

:BTS:LOOPback:GSM:STOP:CRITeria:CIB

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:STOP:CRITeria:CIB <val>
:SENSe:BERT:BTS:LOOPback:GSM:STOP:CRITeria:CIB?
```

This command specifies the threshold number of Class Ib errors to stop the measurement.

***RST** 300

Range 0–1000000

Key Entry **Class Ib Bit Error**

Remarks Refer to ":BTS:LOOPback:GSM:STOP:CRITeria[:SELect]" on page 458 for information on the use of the file variables.

:BTS:LOOPback:GSM:STOP:CRITeria:CII

Supported E4438C with Option 300

`:SENSe:BERT:BTS:LOOPback:GSM:STOP:CRITeria:CII <val>`
`:SENSe:BERT:BTS:LOOPback:GSM:STOP:CRITeria:CII?`

This command specifies the threshold number of Class II errors to stop the measurement.

***RST** 300

Range 0–1000000

Key Entry **Class II Bit Error**

Remarks Refer to “:BTS:LOOPback:GSM:STOP:CRITeria[:SELect]” on page 458 for information on the use of the file variables.

:BTS:LOOPback:GSM:STOP:CRITeria:FERasure

Supported E4438C with Option 300

`:SENSe:BERT:BTS:LOOPback:GSM:STOP:CRITeria:FERasure <val>`
`:SENSe:BERT:BTS:LOOPback:GSM:STOP:CRITeria:FERasure?`

This command specifies the threshold number of erased frames to stop the measurement.

***RST** 120

Range 0–1000000

Key Entry **Frame Erasure**

Remarks Refer to “:BTS:LOOPback:GSM:STOP:CRITeria[:SELect]” for information on the use of the file variables.

:BTS:LOOPback:GSM:STOP:CRITeria[:SELect]

Supported E4438C with Option 300

`:SENSe:BERT:BTS:LOOPback:GSM:STOP:CRITeria[:SELect] FERasure|CIB|CII|ANY|NONE`
`:SENSe:BERT:BTS:LOOPback:GSM:STOP:CRITeria[:SELect]?`

This command sets the threshold criteria used to prematurely stop the measurement prior to the normal measurement end. In each case, the measurement will terminate no later than 200 ms after the threshold is exceeded.

FERasure	This selection ends the measurement when the number of erased frames exceeds the specified threshold.
CIB	This selection ends the measurement when the number of Class Ib errors detected exceeds the specified threshold.
CII	This selection ends the measurement when the number of Class II errors detected exceeds the specified threshold.
ANY	This selection ends the measurement when any of the above stop measurement threshold criteria is exceeded.
NONE	This selection disables the stop measurement threshold criteria function, so that the measurement runs for the specified number of speech frames.

***RST** NONE

Key Entry **Frame Erasure** **Class Ib Bit Error** **Class II Bit Error**

Exceeds Any Thresholds **No Thresholds**

:BTS:LOOPback:GSM:SYNC:RF

Supported E4438C with Option 300

`:SENSe:BERT:BTS:LOOPback:GSM:SYNC:RF`

This command releases the current synchronization with the BTS and immediately starts to try to synchronize to either a BCH or TCH signal as selected with the `SYNC[:SOURce]` command. This command will also stop the current measurement.

Key Entry **Synchronize to BCH/TCH**

Remarks The test equipment can use a BCH signal from the BTS to determine the required transmit timeslot, frame and multiframe timing. The BCH signal is always transmitted in timeslot 0 and contains multiframe information. Use BCH when a BCH subset is present
which contains SCH bursts with a properly coded T2 parameter.

Use TCH when providing a TCH/FS training sequence from the BTS. However, only one timeslot from the BTS can be active at a time and you must specify to the receiver which timeslot is being received since it has no absolute reference (unlike a BCH signal, which is always transmitted in timeslot 0).

:BTS:LOOPback:GSM:SYNC[:SOURce]

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:SYNC[:SOURce] BCH|TCH
:SENSe:BERT:BTS:LOOPback:GSM:SYNC[:SOURce]?
```

This command specifies the synchronization source from the BTS under test.

BCH This choice specifies the broadcast channel as the synchronization source.

TCH This choice specifies the traffic channel as the synchronization source.

***RST** BCH

Key Entry **Sync Source BCH TCH**

:BTS:LOOPback:GSM:TRIGger[:SOURce]

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:TRIGger[:SOURce] IMMediate|KEY|EXT|BUS
:SENSe:BERT:BTS:LOOPback:GSM:TRIGger[:SOURce]?
```

This command determines the trigger source for the GSM loopback bit error rate measurement.

IMMediate This choice begins the measurement directly after synchronization has been achieved.

KEY This choice begins the measurement when the front panel **Trigger** key is pressed, provided that synchronization has been achieved. If synchronization has not occurred, the trigger is ignored.

EXT This choice begins the measurement as soon as a trigger signal is applied to the rear panel connector provided that synchronization has been achieved. If synchronization has not occurred, the trigger is ignored.

BUS This choice enables GPIB triggering using the *TRG or GET command or LAN and RS-232 triggering using the *TRG command.

***RST** KEY

Key Entry **Immediate** **Trigger Key** **Ext** **Bus** **Aux**

Remarks An inherent variable delay will always exist when starting a measurement because the measurement must await the start of the next speech frame after the trigger. The delay can vary between 0 and 23 ms (5 frames) depending on where the trigger falls within the TDMA multiframe.

A trigger is ignored unless the GSM loopback operating state is turned on.

:BTS:LOOPback:GSM:ULINk:OFFSet

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM:ULINk:OFFSet <value>
:SENSe:BERT:BTS:LOOPback:GSM:ULINk:OFFSet?
```

This command specifies the amount of compensation for the insertion of equipment such as fading simulators into the uplink RF path.

***RST** +0

Range –500 to 10000

Key Entry **Uplink Timing Advance**

:BTS:LOOPback:GSM[:STATe]

Supported E4438C with Option 300

```
:SENSe:BERT:BTS:LOOPback:GSM[:STATe] ON|OFF|1|0
:SENSe:BERT:BTS:LOOPback:GSM[:STATe]?
```

This command enables (1) or disables (0) the operating state of the GSM loopback bit error rate function. Although you can configure the measurement parameters while the operating state is off, any command triggers sent will be ignored until the operating state is turned on.

***RST** 0

Key Entry **GSM BERT Off On**

[:BASeband]:PRBS:FUNCtion:SPIGnore:DATA

Supported E4438C with Option UN7

```
:SENSe:BERT[:BASeband]:PRBS:FUNCtion:SPIGnore:DATA ALL_0|ALL_1
:SENSe:BERT[:BASeband]:PRBS:FUNCtion:SPIGnore:DATA?
```

This command selects the bit parameter of the special pattern ignore function.

ALL_0 This choice ignores a bit pattern of 160 or more consecutive 0’s.

ALL_1 This choice ignores a bit pattern of 160 or more consecutive 1’s.

***RST** ALL_0

Key Entry **Spcl Pattern 0’s 1’s**

Remarks This command is valid only when the special pattern ignore function is enabled (On). Refer to “[:BASeband]:PRBS:FUNCtion:SPIGnore[:STATe]”. The special pattern of 160 or more 1’s or 0’s can appear at any position in the bit stream.

[:BASeband]:PRBS:FUNCtion:SPIGnore[:STATe]

Supported E4438C with Option UN7

```
:SENSe:BERT[:BASeband]:PRBS:FUNCtion:SPIGnore[:STATe] ON|OFF|1|0
:SENSe:BERT[:BASeband]:PRBS:FUNCtion:SPIGnore[:STATe]?
```

This command enables (1) or disables (0) the special pattern ignore function.

ON — This choice detects 160 or more consecutive bits of 0's or 1's in the incoming bit stream and ignores these bits when making BER measurements. To select 0's or 1's refer to "[:BASeband]:PRBS:FUNCtion:SPIGnore:DATA"

OFF — This choice disables the special pattern ignore mode for the BER measurement.

***RST** 0

Key Entry **Spcl Pattern Ignore Off On**

[:BASeband]:PRBS[:DATA]

Supported E4438C with Option UN7

```
:SENSe:BERT[:BASeband]:PRBS[:DATA] PN9|PN11|PN15|PN20|PN23
:SENSe:BERT[:BASeband]:PRBS[:DATA]?
```

This command selects the incoming data pattern for making BER measurements.

PN9–PN23 — These choices select an internally generated pseudo-random pattern for BER measurements.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23**

[:BASeband]:RSYNc:THReshold

Supported E4438C with Option UN7

```
:SENSe:BERT[:BASeband]:RSYNc:THReshold <val>
:SENSe:BERT[:BASeband]:RSYNc:THReshold?
```

This command specifies the threshold level for the resynchronizing function.

***RST** 0.40

Range 0.05–0.40

Key Entry **Resync Limits**

Remarks This command is valid only when the BERT resynchronizing function is on. Refer to "[:BASeband]:RSYNc[:STATe]" on page 463.

[:BASeband]:RSYNc[:STATe]

Supported E4438C with Option UN7

```
:SENSe:BERT[:BASeband]:RSYNc[:STATe] ON|OFF|1|0
:SENSe:BERT[:BASeband]:RSYNc[:STATe]?
```

This command sets the operating state of the resynchronization function.

ON This choice enables the resynchronization function.

OFF This choice disables the resynchronization function.

***RST** 1

Key Entry **BERT Resync Off On**

[:BASeband]:STATe

Supported E4438C with Option UN7

```
:SENSe:BERT[:BASeband]:STATe ON|OFF|1|0
:SENSe:BERT[:BASeband]:STATe?
```

This command sets the operating state of the bit error rate test (BERT) measurement.

ON This choice enables the BERT measurement.

OFF This choice disables the BERT measurement.

***RST** 0

Key Entry **BERT Off On**

[:BASeband]:STOP:CRITeria:EBIT

Supported E4438C with Option UN7

```
:SENSe:BERT[:BASeband]:STOP:CRITeria:EBIT <val>
:SENSe:BERT[:BASeband]:STOP:CRITeria:EBIT?
```

This command specifies the threshold limit to stop the measurement.

***RST** 100

Range 0–1000000000

Key Entry **Error Count**

Remarks When the stop mode criteria is set to EBIT, the signal generator monitors the error bits and when it exceeds the set value, the signal generator stops the current BER measurement and waits for the next trigger.

EBIT must be the selection for this command to work. To select EBIT refer to “[:BASeband]:STOP:CRITeria[:SELect]”.

[:BASeband]:STOP:CRITeria[:SELect]

Supported E4438C with Option UN7

```
:SENSe:BERT[:BASeband]:STOP:CRITeria[:SELect] EBIT|NONE
:SENSe:BERT[:BASeband]:STOP:CRITeria[:SELect]?
```

This command determines which threshold criteria is used to prematurely stop the measurement.

EBIT This choice enables a specified number of bit errors to prematurely stop the measurement.

NONE This choice disables the stop measurement threshold criteria function.

***RST** NONE

Key Entry **Error Count** **No Thresholds**

Remarks The measurement will terminate no later than 200 ms after the threshold is exceeded.

[:BASeband]:TBITs

Supported E4438C with Option UN7

```
:SENSe:BERT[:BASeband]:TBITs <val>
:SENSe:BERT[:BASeband]:TBITs?
```

This command specifies the total bit count to be measured in one measurement cycle.

***RST** +10000

Range 100–4294967295

Key Entry **Total Bits**

[:BASeband]:TRIGger:BDELay

Supported E4438C with Option UN7

```
:SENSe:BERT[:BASeband]:TRIGger:BDELay <val>
:SENSe:BERT[:BASeband]:TRIGger:BDELay?
```

This command specifies the number of bits to delay the trigger signal.

***RST** 0

Range 0–65535

Key Entry **Delay Bits**

Remarks This command is valid only when the trigger bit delay function is on. Refer to "[:BASeband]:TRIGger:BDELay:STATe".

[:BASeband]:TRIGger:BDELay:STATe

Supported E4438C with Option UN7

```
:SENSe:BERT[:BASeband]:TRIGger:BDELay:STATe ON|OFF|1|0
:SENSe:BERT[:BASeband]:TRIGger:BDELay:STATe?
```

This command sets the operating state of the trigger delay function.

ON This choice enables the trigger delay function.

OFF This choice disables the trigger delay function.

***RST** 0

Key Entry **Bit Delay Off On**

Remarks This command needs to be set to ON before the number of bits for the trigger delay can be set. Refer to "[:BASeband]:TRIGger:BDELay".

[:BASeband]:TRIGger:COUNt

Supported E4438C with Option UN7

```
:SENSe:BERT[:BASeband]:TRIGger:COUNt <val>
:SENSe:BERT[:BASeband]:TRIGger:COUNt?
```

This command sets the number of times the bit error rate test (BERT) measurements will repeat.

***RST** 1

Range 0–65535

Key Entry **Cycle Count**

Remarks With 0 set, the BER measurements are repeated until you set the BERT operating state is set to off. Refer to "[:BASeband]:STATe" on page 463.

[:BASeband]:TRIGger:POLarity

Supported E4438C with Option UN7

```
:SENSe:BERT[:BASeband]:TRIGger:POLarity POSitive|NEGative
:SENSe:BERT[:BASeband]:TRIGger:POLarity?
```

This command selects the polarity of the trigger signal.

POSitive This choice triggers on the rising edge of the input data signal.

NEGative This choice triggers on the falling edge of the input data signal.

***RST** POS

Key Entry **Aux I/O Trigger Polarity Pos Neg**

Key Entry **Aux I/O Trigger Polarity Pos Neg**

[:BASeband]:TRIGger[:SOURce]

Supported E4438C with Option UN7

```
:SENSe:BERT[:BASeband]:TRIGger[:SOURce] IMMediate|KEY|EXT|BUS|AUX
:SENSe:BERT[:BASeband]:TRIGger[:SOURce]?
```

This command selects the triggering type for starting the bit error rate test (BERT) measurements.

IMMediate This choice begins the measurement directly after synchronization has been achieved.

KEY This choice begins the measurement when the front panel **Trigger** key is pressed, provided that synchronization has been achieved. If synchronization has not occurred, the trigger is ignored.

EXT This choice begins the measurement as soon as a trigger signal is applied to the rear panel connector provided that synchronization has been achieved. If synchronization has not occurred, the trigger is ignored.

BUS This choice enables GPIB triggering using the `*TRG` or `GET` command or LAN and RS-232 triggering using the `*TRG` command.

AUX This choice triggers an event using the rear panel AUX I/O connector pin #22. Refer to the *E4428C/38C ESG Signal Generators User's Guide*.

***RST** KEY

Key Entry **Immediate** **Trigger Key** **Ext** **Bus** **Aux I/O**

8 Receiver Test Digital Commands

This chapter provides SCPI descriptions for commands dedicated to digital real-time testing using the E4438C ESG Vector Signal Generator. This chapter contains the following sections:

All Subsystem–Option 001/601or 002/602 ([:SOURce])

:RADio:ALL:OFF

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:ALL:OFF
```

This command disables all digital modulation personalities on a particular baseband.

Remarks This command does not affect analog modulation.

AWGN Real-Time Subsystem–Option 403 ([:SOURce]:RADio:AWGN:RT)

:BWIDth

Supported E4438C with Option 403

```
[:SOURce]:RADio:AWGN:RT:BWIDth <val>
[:SOURce]:RADio:AWGN:RT:BWIDth?
```

This command adjusts the real-time AWGN bandwidth value.

The variable <val> is expressed in units of Hertz (Hz–MHz).

***RST** +1.00000000E+006

Range 5E4–8E7

Key Entry **Bandwidth**

[:STATe]

Supported E4438C with Option 403

```
[:SOURce]:RADio:AWGN:RT[:STATe] ON|OFF|1|0
[:SOURce]:RADio:AWGN:RT[:STATe]?
```

This command enables or disables the operating state of real-time AWGN.

***RST** 0

Key Entry **Real-time AWGN Off On**

Bluetooth Subsystem–Option 406 ([:SOURce]:RADio:BLUEtooth:ARB)

:AMADdr

Supported E4438C with Option 406406

```
[:SOURce]:RADio:BLUEtooth:ARB:AMADdr <val>
[:SOURce]:RADio:BLUEtooth:ARB:AMADdr?
```

This command sets the 3-bit active member address (AM_ADDR).

***RST** +1

Range 0–7

Key Entry **AM_ADDR**

Remarks In a piconet, one or more slaves are connected to a single master; a temporary 3-bit address (AM_ADDR) is used to identify each active slave.

:BDADdr

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:BDADdr <val>
[:SOURce]:RADio:BLUEtooth:ARB:BDADdr?
```

This command sets the unique hexadecimal Bluetooth device address (BD_ADDR) with up to 48 bits.

***RST** #H000000000008

Range #H0–#HFFFFFFFFFFFF

Key Entry **BD_ADDR**

Remarks The address is derived from the IEEE802 standard.

:BURSt[:STATe]

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:BURSt[:STATe] ON|OFF|1|0
[:SOURce]:RADio:BLUEtooth:ARB:BURSt[:STATe]?
```

This command enables or disables the burst function.

ON(1) This choice will ramp up the signal power prior to transmitting the packet and ramp it down after the end of the packet transmission.

OFF(0) This choice provides a linked series of packet transmissions with no power ramping.

***RST** 1

Key Entry **Burst Off On**

:CGDelay

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:CGDelay <val>
[:SOURce]:RADio:BLUEtooth:ARB:CGDelay?
```

This command sets the number of symbols to shift the output symbol clock (EVENT 1 rear panel connector) and gate (EVENT 2 rear panel connector) signals relative to the Bluetooth signal. The shifting of these signals is used to compensate for any packet delay through the DUT during BER tests.

***RST** +0.00000000E+000

Range 0.0–24999.9

Key Entry **Clock/Gate Delay**

Remarks This command is only effective with a continuous PN9 (CPN9) payload data and is intended for bit error rate testing (BERT, Option UN7). Refer to ":DATA" on page 471 for selecting the CPN9 data choice.

When the clock and gate delay is set to zero (0), the rising edge of the symbol clock lines up with the middle of each symbol and the gate is high during the user payload field (PN9 data).

:DATA

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:DATA TPN9|CPN9|<val>
[:SOURce]:RADio:BLUEtooth:ARB:DATA?
```

This command sets the user payload data type; user payload data is the voice or data information (less the payload header) that is carried in a packet.

TPN9 This choice places a truncated PN9 sequence consisting of 216 bits into a single packet.

CPN9 This choice places 8 continuous PN9 sequences into 19 packets, followed by one packet with no user payload. This ensures that the SEQN bit is properly alternated which is a requirement to filter out packet re-transmission at the destination.

<val> This variable lets you set your own 8 bit data pattern for a single packet. A change in the user payload data type resets the eight bit pattern to a value of 00000000.

***RST** TPN9

Range <val>: #B0–#B11111111 or 0–255

Key Entry **Truncated PN9** **Continuous PN9** **8 Bit Pattern**

Remarks The PN9 sequence (511 bits) is standard based. The sequence begins with the first one of nine consecutive ones.

:IQ:EXTernal:FILTer

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:IQ:EXTernal:FILTer 40e6|THRough
[:SOURce]:RADio:BLUEtooth:ARB:IQ:EXTernal:FILTer?
```

This command selects the filter or through path for I/Q signals routed to the rear panel I and Q outputs. Selecting a filter with this command will automatically set ":IQ:EXTernal:FILTer:AUTO" on page 472 to OFF (0) mode.

40e6 This choice applies a 40 MHz baseband filter.

THRough This choice bypasses filtering.

***RST** THR

Key Entry **40.000 MHz** **Through**

:IQ:EXTernal:FILTer:AUTO

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:IQ:EXTernal:FILTer:AUTO ON|OFF|1|0
[:SOURce]:RADio:BLUEtooth:ARB:IQ:EXTernal:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals routed to the rear panel I/Q outputs.

ON (1) This choice will automatically select a digital modulation filter optimized for the current signal generator settings.

OFF (0) This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to ":IQ:EXTernal:FILTer" on page 472 for selecting a filter or through path.

***RST** 1

Key Entry **I/Q Output Filter Manual Auto**

:HEADer:CLEar

Supported E4438C with Option 406

`[:SOURce]:RADio:BLUEtooth:ARB:HEADer:CLEar`

This command clears the header information from the header file used by this format.

Key Entry **Clear Header**

Remarks The **Bluetooth Off On** softkey must be set to On for this command to function.

:HEADer:SAVE

Supported E4438C with Option 406

`[:SOURce]:RADio:BLUEtooth:ARB:HEADer:SAVE`

This command saves the header information to the header file used by this format.

Key Entry **Save Setup To Header**

Remarks The **Bluetooth Off On** must be set to On for this command to function.

:IMPairments

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:IMPairments ON|OFF|1|0
[:SOURce]:RADio:BLUEtooth:ARB:IMPairments?
```

This command enables or disables the Bluetooth signal impairment function.

ON(1) This choice enables the current impairment settings.

OFF(0) This choice disables the impairments.

***RST** 0

Key Entry **Impairments Off On**

:IMPairments:AWGN

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:IMPairments:AWGN ON|OFF|1|0
[:SOURce]:RADio:BLUEtooth:ARB:IMPairments:AWGN?
```

This choice enables or disables the additive white gaussian noise (AWGN) impairment.

***RST** 0

Key Entry **AWGN Off On**

Remarks The AWGN impairment is not added to the signal until the Bluetooth signal impairment function is enabled. Refer to ":IMPairments" for enabling the impairments.

:IMPairments:AWGN:CNR

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:IMPairments:AWGN:CNR <val>
[:SOURce]:RADio:BLUEtooth:ARB:IMPairments:AWGN:CNR?
```

This command sets the carrier to noise ratio expressed in a 1 MHz bandwidth for the additive white gaussian noise (AWGN) impairment.

The variable <val> is expressed in units of decibels (dB).

***RST** +21

Range 10–40

Key Entry **C/N[1MHz]**

Remarks The value set by this command does not affect the Bluetooth signal until both the AWGN impairment and the Bluetooth signal impairment function are enabled. Refer to ":IMPairments:AWGN" on page 474 for more information.

:IMPairments:AWGN:NSEed

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:IMPairments:AWGN:NSEed <val>
[:SOURce]:RADio:BLUEtooth:ARB:IMPairments:AWGN:NSEed?
```

This command sets the noise seed value for the additive white gaussian noise (AWGN) impairment.

***RST** +1

Range 1–65535

Key Entry **Noise Seed**

Remarks A change in the seed value changes the noise pattern.

The value set by this command does not affect the Bluetooth signal until both the AWGN impairment and the Bluetooth signal impairment function are enabled. Refer to ":IMPairments:AWGN" on page 474 for more information.

:IMPairments:DDEViation

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:IMPairments:DDEViation <val>
[:SOURce]:RADio:BLUEtooth:ARB:IMPairments:DDEViation?
```

This command sets the maximum linear or sinusoidal carrier frequency drift deviation during the Bluetooth packet transmission.

The variable <val> is expressed in units of kilohertz (–kHz to kHz) with a minimum resolution of 1 kHz.

***RST** +0.00000000E+000

Range –1E5 to –1E3, 0, 1E3 to 1E5

Key Entry **Drift Deviation**

Remarks Refer to ":IMPairments:FDType" on page 476 for selecting either a linear or sinusoidal frequency drift.

The value set by this command does not affect the Bluetooth signal until the Bluetooth signal impairment function is enabled. Refer to ":IMPairments" on page 473 for more information.

:IMPairments:FDType

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:IMPairments:FDType LINear|SINE
[:SOURce]:RADio:BLUEtooth:ARB:IMPairments:FDType?
```

This command sets the carrier frequency drift impairment type that will occur during the length of the Bluetooth packet transmission.

LINear This choice enables the carrier frequency to drift linearly from the signal generator carrier frequency setting to the value entered for the frequency drift.

SINE This choice enables the carrier frequency to drift sinusoidally above and below the signal generator carrier frequency setting. For example, if the carrier signal generator setting is 2.4 GHz and the drift value was 100 kHz, the carrier frequency would sinusoidally drift to 2.4001 GHz, back to 2.4 GHz and continue drifting to frequency values less than 2.4 GHz until the packet transmission ends. With a negative drift value, the carrier frequency deviation would begin drifting toward
2.3999 GHz at the beginning of the drift cycle.

***RST** SINE

Key Entry **Freq Drift Type Linear Sine**

Remarks To set a drift value, refer to ":IMPairments:DDEViation" on page 475.

The value set by this command does not affect the Bluetooth signal until the Bluetooth signal impairment function is enabled. Refer to ":IMPairments" on page 473 for more information.

The carrier frequency value on the signal generator display does not change during the drift impairment.

:IMPairments:FOFFset

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:IMPairments:FOFFset <val>
[:SOURce]:RADio:BLUEtooth:ARB:IMPairments:FOFFset?
```

This command sets a carrier frequency offset impairment value as part of a Bluetooth setup.

The variable <val> is expressed in units of kilohertz (–kHz to kHz) with a minimum resolution of 1 kHz.

***RST** +0.00000000E+000

Range –1E5 to –1E3, 0, 1E3 to 1E5

Key Entry **Freq Offset**

Remarks The value set by this command does not affect the Bluetooth signal until the Bluetooth signal impairment function is enabled. Refer to “:IMPairments” on page 473 for more information.

The carrier frequency value on the signal generator display does not change during the offset impairment.

:IMPairments:MINDex

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:IMPairments:MINDex <val>
[:SOURce]:RADio:BLUEtooth:ARB:IMPairments:MINDex?
```

This command sets the modulation index impairment value for the Bluetooth waveform.

***RST** +3.15000000E–001

Range 2.5E–1 to 4E–1

Key Entry **Mod Index**

Remarks The value set by this command does not affect the Bluetooth signal until the Bluetooth signal impairment function is enabled. Refer to “:IMPairments” on page 473 for more information.

Only the peak-to-peak frequency deviation is changed by this command; the bit rate (1 MHz) remains constant. The modulation index is derived from the following formula:

$$\text{Mod Index} = \frac{\text{Peak-to-Peak Frequency Deviation}}{\text{Bit Rate}}$$

:IMPairments:STERror

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:IMPairments:STERror <val>
[:SOURce]:RADio:BLUEtooth:ARB:IMPairments:STERror?
```

This command sets the symbol timing error impairment value for the Bluetooth waveform.

The variable <val> is expressed in units of parts per million (ppm) and in units of hertz (Hz). A 20 ppm timing error corresponds to a 20 Hz shift in the symbol rate. The range value indicated below applies to both units of measurement.

***RST** +0

Range –50 to 50

Key Entry **Symbol Timing Err**

Remarks The value set by this command does not affect the Bluetooth signal until the Bluetooth signal impairment function is enabled. Refer to “:IMPairments” on page 473 for more information.

:IQ:MODulation:ATTen

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:IQ:MODulation:ATTen <val>
[:SOURce]:RADio:BLUEtooth:ARB:IQ:MODulation:ATTen?
```

This command attenuates the I/Q signals being modulated through the signal generator RF path.

The variable <val> is expressed in units of decibels (dB).

ON (1) This choice enables the attenuation auto mode which optimizes the modulator attenuation for the current conditions.

OFF (0) This choice holds the attenuator at its current setting or at a selected value. Refer to “:IQ:MODulation:ATTen” on page 478 for setting the attenuation value.

***RST** +2.00000000E+000

Range 0–40

Key Entry **Modulator Atten Manual Auto**

:IQ:MODulation:ATTen:AUTO

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:IQ:MODulation:ATTen:AUTO ON|OFF|1|0
[:SOURce]:RADio:BLUEtooth:ARB:IQ:MODulation:ATTen:AUTO?
```

This command enables or disables the I/Q attenuation auto mode.

***RST** 1

Key Entry **Modulator Atten Manual Auto**

:IQ:MODulation:FILTer

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:IQ:MODulation:FILTer 2.1e6|40e6|THRough
[:SOURce]:RADio:BLUEtooth:ARB:IQ:MODulation:FILTer?
```

This command enables you to select a filter or through path for I/Q signals modulated onto the RF carrier. Selecting a filter with this command will set ":IQ:MODulation:ATTen:AUTO" on page 479 to OFF(0) mode.

2.1E6	This choice applies a 2.1 MHz baseband filter to the I/Q signals.
40E6	This choice applies a 40 MHz baseband filter to the I/Q signals.
THRough	This choice bypasses filtering.

***RST** THR

Key Entry **2.100 MHz** **40.000 MHz** **Through**

:IQ:MODulation:FILTer:AUTO

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:IQ:MODulation:FILTer:AUTO ON|OFF|1|0
[:SOURce]:RADio:BLUEtooth:ARB:IQ:MODulation:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals modulated onto the RF carrier.

ON(1) This choice will automatically select a digital modulation filter.

OFF(0) This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to ":IQ:MODulation:FILTer" on page 479 for selecting a filter or through path.

***RST** 1

Key Entry **I/Q Mod Filter Manual Auto**

:MDEStination:AAMPlitude

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:MDEStination:AAMPlitude NONE|M1|M2|M3|M4
[:SOURce]:RADio:BLUEtooth:ARB:MDEStination:AAMPlitude?
```

This command routes the selected marker to the Alternate Amplitude function. The `NONE` parameter clears the marker for the Alternate Amplitude function.

***RST** NONE

Key Entry **None** **Marker 1** **Marker 2** **Marker 3** **Marker 4**

:MDEStination:ALCHold

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:MDEStination:ALCHold NONE|M1|M2|M3|M4
[:SOURce]:RADio:BLUEtooth:ARB:MDEStination:ALCHold?
```

This command routes the selected marker to the ALC Hold function. The `NONE` parameter clears the marker for the ALC Hold function.

***RST** NONE

Key Entry **None** **Marker 1** **Marker 2** **Marker 3** **Marker 4**

:MDEStination:PULSe

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:MDEStination:PULSe NONE|M1|M2|M3|M4
[:SOURce]:RADio:BLUEtooth:ARB:MDEStination:PULSe?
```

This command routes the selected marker to the Pulse/RF Blanking function. The `NONE` parameter clears the marker for the Pulse/RF Blanking function.

***RST** NONE

Key Entry **None** **Marker 1** **Marker 2** **Marker 3** **Marker 4**

:MPOLarity:MARKer1|2|3|4

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:MPOLarity:MARKer1|2|3|4 NEGative|POSitive
[:SOURce]:RADio:BLUEtooth:ARB:MPOLarity:MARKer1|2|3|4?
```

This command sets the polarity for the selected marker. For a positive marker polarity, the marker signal is high during the marker points. For a negative marker polarity, the marker signal is high during the period of no marker points.

Example

```
:RAD:ARB:MPOL:MARK3 NEG
```

The preceding example sets the polarity for marker 3 to negative.

***RST** POS

Key Entry **Marker 1 Polarity Neg Pos** **Marker 2 Polarity Neg Pos** **Marker 3 Polarity Neg Pos**

Marker 4 Polarity Neg Pos

:MPOLarity:MARKer1

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:MPOLarity:MARKer1 NEGative|POSitive
[:SOURce]:RADio:BLUEtooth:ARB:MPOLarity?
```

This command sets the polarity for marker 1.

***RST** POS

Key Entry **Marker 1 Polarity Neg Pos**

:MPOLarity:MARKer2

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:MPOLarity:MARKer2 NEGative|POSitive
[:SOURce]:RADio:BLUEtooth:ARB:MPOLarity:MARKer2?
```

This command sets the polarity for marker 2.

***RST** POS

Key Entry **Marker 2 Polarity Neg Pos**

:MPOLarity:MARKer3

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:MPOLarity:MARKer3 NEGative|POSitive
[:SOURce]:RADio:BLUEtooth:ARB:MPOLarity:MARKer3?
```

This command sets the polarity for marker 3.

***RST** POS

Key Entry **Marker 3 Polarity Neg Pos**

:MPOLarity:MARKer4

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:MPOLarity:MARKer4 NEGative|POSitive
[:SOURce]:RADio:BLUEtooth:ARB:MPOLarity:MARKer4?
```

This command sets the polarity for marker 4.

***RST** POS

Key Entry **Marker 4 Polarity Neg Pos**

:PACKet

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:PACKet DH1
[:SOURce]:RADio:BLUEtooth:ARB:PACKet?
```

This command selects a DH1 packet.

***RST** DH1

Choices DH1

Key Entry **Packet (DH1)**

Remarks A DH1 packet covers a single timeslot.

:REFernce:EXTernal:FREQuency

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:REFerence:EXTernal:FREQuency <val>
[:SOURce]:RADio:BLUEtooth:ARB:REFerence:EXTernal:FREQuency?
```

This command sets the lock frequency of the internal ARB waveform clock to match the externally applied ARB waveform clock reference at the BASEBAND GEN REF IN connector.

The variable <val> is expressed in units of hertz (Hz–MHz).

***RST** +1.00000000+007

Range 2.5E5–1E8

Key Entry **Reference Freq**

Remarks Use this command when EXTernal is the ARB waveform clock reference source. Refer to ":REFerence[:SOURce]" on page 483 for selecting either the internal or an external source.

:REFerence[:SOURce]

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:REFerence[:SOURce] INTernal|EXTernal
[:SOURce]:RADio:BLUEtooth:ARB:REFerence[:SOURce]?
```

This command selects either an internal or external reference for the ARB waveform clock.

***RST** INT

Key Entry **ARB Reference Ext Int**

Remarks If the EXTernal choice is selected, the frequency of the external reference must be entered into the signal generator and the signal must be applied to the BASEBAND GEN REF IN connector. Refer to ":REFernce:EXTernal:FREQuency" on page 483 for entering the frequency value.

:RSYMbols

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:RSYMbols <val>
[:SOURce]:RADio:BLUEtooth:ARB:RSYMbols?
```

This command controls how long it takes the RF burst to ramp up at the beginning of the packet transmission and down at the end.

The variable <val> is expressed in symbols (1 symbol interval equals 1 µs).

***RST** +6

Range 1–10

Key Entry **Burst Power Ramp**

:SCLock:RATE

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB:SCLock:RATE <val>
[:SOURce]:RADio:BLUEtooth:ARB:SCLock:RATE?
```

This command sets the sample clock rate for the Bluetooth modulation format.

The variable <val> is expressed in units of hertz.

***RST** +1.00000000E+008

Range 1–1E8

Key Entry **ARB Sample Clock**

[:STATe]

Supported E4438C with Option 406

```
[:SOURce]:RADio:BLUEtooth:ARB[:STATe] ON|OFF|1|0
[:SOURce]:RADio:BLUEtooth:ARB[:STATe]?
```

This command enables or disables the Bluetooth waveform generator.

***RST** 0

Key Entry **Bluetooth Off On**

CDMA2000 BBG Subsystem–Option 401 ([:SOURce]:RADio:CDMA2000[:BBG])

:LMODe

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:LMODe FORWard|RT12|RA12|RT34|RE34|RC34
[:SOURce]:RADio:CDMA2000[:BBG]:LMODe?
```

This command selects either forward or reverse link Real Time CDMA2000.

FORWard	This choice selects the forward link mode.
RT12	This choice selects the reverse traffic channel for radio configurations one and two.
RA12	This choice selects the reverse access channel for radio configurations one and two.
RT34	This choice selects the reverse traffic channel for radio configurations three and four.
RE34	This choice selects the reverse enhanced access channel for radio configurations three and four.
RC34	This choice selects the reverse common control channel for radio configurations three and four.

***RST** FORW

Key Entry **Link Forward Reverse** **RadioConfig 1/2 Traffic** **RadioConfig 1/2 Access** **RadioConfig 3/4 Traffic** **RadioConfig 3/4 Enhanced Access** **RadioConfig 3/4 Common Control**

[:FORWard]:BBCLock

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:BBCLock INT[1]|EXT[1]
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:BBCLock?
```

This command selects the baseband data clock source for the forward link.

***RST** INT

Field Entry `BBG Data Clock`

Remarks If the EXT choice is selected, the external frequency must be entered and the signal must be applied to the BASEBAND GEN REF IN rear panel connector.

[:FORWard]:CHIPrate

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:CHIPrate <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:CHIPrate?
```

This command adjusts the chip rate value.

The variable <val> is expressed in units of chips per second (cps–Mcps).

***RST** +1.22880000E+006

Range 1E3–1.3E6

Field Entry `Chip Rate`

Remarks The default value (1.228800 Mcps) is in accordance with the IS-2000 specification.

[:FORWard]:ESDelay

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:ESDelay <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:ESDelay?
```

This command modifies the even second clock pulse.

***RST** +2.00000000E+001

Range 0.5–128.0

Field Entry `Even Second Delay`

Remarks The even second clock pulse sets the delay to align the RF with the trigger.

When the noise function is set to ON, this value will increase. Refer to “[:FORWard]:NOISe[:STATe]” on page 512 for more information.

[:FORWard]:FILTer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FILTer RNYQuist|NYQuist|
GAUSsian|RECTangle|IS95|IS95_EQ|IS95_MOD|IS95_MOD_EQ|AC4Fm|UGGaussian|
"<user FIR>"|
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FILTer?
```

This command specifies the filter type.

IS95 This choice selects a filter that meets the criteria of the IS-95 standard.

IS95_EQ This choice selects a filter which is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard. This filter is only used for IS-95 baseband filtering.

IS95_MOD This choice selects a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.

IS95_MOD_EQ This choice selects a filter which is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance), with lower passband rejection.

AC4Fm This choice selects a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM)

filter.

UGGaussian This choice selects a backwards compatible GSM Gaussian filter (Gaussian filter with a fixed BbT value of 0.300) for the ESG E44xxB Option UN3 or UN4.

"<user FIR>" This variable is any filter file that you have stored into memory.

***RST** IS95_EQ

Key Entry **Root Nyquist** **Nyquist** **Gaussian** **Rectangle** **IS-95** **IS-95 w/EQ**

IS-95 Mod **IS-95 MOD w/EQ** **APCO 25 C4FM** **UN3/4 GSM Gaussian**

User FIR

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

[:FORWard]:FILTer:ALPHa

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FILTer:ALPHa <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FILTer:ALPHa?
```

This command changes the Nyquist or root Nyquist filter's alpha value.

The filter alpha value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +2.20000000E–001

Range 0.000–1.000

Key Entry **Filter Alpha**

Remarks To change the current filter type, refer to "[:FORWard]:FILTer" on page 487.

[:FORWard]:FILTer:BBT

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FILTer:BBT <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FILTer:BBT?
```

This command changes the bandwidth-multiplied-by-bit-time filter value.

The filter BbT value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +5.00000000E–001

Range 0.000–1.000

Key Entry **Filter BbT**

Remarks This command is effective only after choosing a Gaussian filter. It does not have an effect on other types of filters.

To change the current filter type, refer to "[:FORWard]:FILTer" on page 487.

[:FORWard]:FILTer:CHANnel

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FILTer:CHANnel EVM|ACP
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FILTer:CHANnel?
```

This command optimizes the Nyquist and root Nyquist filters to minimize error vector magnitude (EVM) or to minimize adjacent channel power (ACP).

EVM	This choice provides the most ideal passband.
ACP	This choice improves stopband rejection.
***RST**	EVM
Key Entry	**Optimize FIR For EVM ACP**
Remarks	To change the current filter type, refer to "[:FORWard]:FILTer" on page 487.

[:FORWard]:LCSTate

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:LCSTate <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:LCSTate?
```

This command sets the long code seed used to generate the long code for the forward link.

***RST**	#H00000000000
Range	#H0–#H3FFFFFFFFFF
Field Entry	`Long Code State`
Remarks	The storage register for the long code state allows a 42-bit binary number to be entered.

[:FORWard]:FFCH:DATA

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:DATA PN9|PN15|FIX4|
"<file name>"|EXT
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:DATA?
```

This command configures the data field for the forward fundamental channel.

***RST**	PN9
Key Entry	**PN9 PN15 FIX4 User File Ext**
Remarks	Refer to "File Name Variables" on page 13 for information on the file name syntax.

[:FORWard]:FFCH:DATA:FIX4

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:DATA:FIX4 <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:DATA:FIX4?
```

This command selects a fixed 4-bit data pattern to be repeated as necessary to fill the selected data area.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

[:FORWard]:FFCH:EBNO

Supported E4438C with Options 401 and 403

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:EBNO <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:EBNO?
```

This command sets the ratio of energy per bit to noise power spectral density (expressed in dB) for the forward fundamental channel.

***RST** +0.00000000E+000

Range

$$\text{min EbNo: } 10\log_{10}\left[\frac{\text{Chip Rate}}{1000(\text{Bit Rate})}\right] + \text{Normalized Power} + \text{RCFactor}$$

$$\text{max EbNo: } 10\log_{10}\left[\frac{1000(\text{Chip Rate})}{\text{Bit Rate}}\right] + \text{Normalized Power} + \text{RCFactor}$$

Normalized Power is the channel amplitude after adjusting the code power to 0 dB. Refer to “[:FORWard]:PADJust” on page 514 for adjusting the code domain power.

RCFactor is dependent on the selected radio configuration. The following table shows the RCFactor by radio configuration.

RC	RCFactor
1	$10\log_{10}\left[\frac{1}{2}\left(\frac{11}{11+\frac{9600}{\text{Bit Rate}}}\right)\right]$
2	$10\log_{10}\left[\frac{1}{2}\left(\frac{23}{23+\frac{14400}{\text{Bit Rate}}}\right)\right]$

RC	RCFactor
3, 4	$10\log_{10}\left[\dfrac{11}{11+\dfrac{9600}{\text{Bit Rate}}}\right]$
5	$10\log_{10}\left[\dfrac{11}{11+\dfrac{14400}{\text{Bit Rate}}}\right]$

Field Entry `EbNo`

Remarks Changes to the EbNo values also change the EcNo values for all other channels in the current link (forward or reverse).

Queries of this command are only valid for the current operating state.

[:FORWard]:FFCH:FOFFset

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:FOFFset <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:FOFFset?
```

This command sets the frame offset value for the forward fundamental channel.

***RST** +0

Range 0–15

Field Entry `Frame Offset`

Remarks Changing this value also changes the frame offset value for the forward supplemental channels (FSCH1 and FSCH2).

[:FORWard]:FFCH:LCMask

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:LCMask?
```

This command outputs the contents of the long code mask field for the forward fundamental channel.

***RST** #H31800000000

Remarks This value is shared by the forward supplemental channels (FSCH1 and FSCH2).

[:FORWard]:FFCH:LCMask:ESN

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:LCMask:ESN <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:LCMask:ESN?
```

This command sets the permuted electronic serial number (ESN) for the long code mask, which is used to identify a particular mobile.

***RST** #H00000000

Range #H0–#HFFFFFFFF

Field Entry `Permuted ESN`

Remarks Changing this value also changes the permuted ESN for the long code mask in the forward supplemental channels (FSCH1 and FSCH2).

[:FORWard]:FFCH:LCMask:HEADer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:LCMask:HEADer <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:LCMask:HEADer?
```

This command sets the header for the long code mask, which is used to identify a particular mobile.

***RST** #H318

Range 000–3FF

Field Entry `Header`

Remarks Changing this value also changes the header for the long code mask in the forward supplemental channels (FSCH1 and FSCH2).

[:FORWard]:FFCH:POWer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:POWer <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:POWer?
```

This command sets the power for the forward fundamental channel.

The variable <val> is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –40 to 0

Field Entry `Power`

[:FORWard]:FFCH:PRAMp

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:PRAMp ON|OFF|1|0
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:PRAMp?
```

This command sets the power puncturing operating state for the forward fundamental channel.

***RST** 1

Field Entry `Ramp`

[:FORWard]:FFCH:PRTime

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:PRTime <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:PRTime?
```

This command sets the power ramp time indicator values for the forward fundamental channel.

Power frame indicators are used to command the mobile (increasing or decreasing power). For example, if 4 is the selected value, it will cause the mobile to respond with 4 sequential power increases, then 4 power decreases. This pattern will continue indefinitely.

The variable <val> is expressed in

***RST** +1

Range 1–80

Field Entry `Ramp Time`

[:FORWard]:FFCH:QOF

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:QOF <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:QOF?
```

This command sets the quasi-orthogonal function channel value.

***RST** +0

Range 0–3

Field Entry `QOF`

[:FORWard]:FFCH:RATE

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:RATE 1.2kbps|1.5kbps|
1.8kbps|2.4kbps|2.7kbps|3.6kbps|4.8kbps|7.2kbps|9.6kbps|14.4kbps
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:RATE?
```

This command sets the data rate for the forward paging channel.

The variable <val> is expressed in units of bits per second (bps–Mbps).

***RST** +9.60000000E+003

Range 1.2E3–1.44E4

Field Entry `Bit Rate`

[:FORWard]:FFCH:RCONfig

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:RCONfig <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:RCONfig?
```

This command sets the radio configuration value for the forward fundamental channel.

***RST** +3

Range 1–5

Field Entry `Radio Config`

[:FORWard]:FFCH:WALSh

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:WALSh <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH:WALSh?
```

Execute this command to set the Walsh code for the forward fundamental channel.

***RST** +10

Range RC1,2,3, & 5: 0–63 RC4: 0–127

Field Entry `Walsh`

[:FORWard]:FFCH[:STATe]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH[:STATe] ON|OFF|1|0
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FFCH[:STATe]?
```

This command enables or disables the operating state of the forward fundamental channel.

***RST** 0

Field Entry `State`

[:FORWard]:FPCH:DATA

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPCH:DATA DEFault|"<file name>"
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPCH:DATA?
```

This command configures the data field for the forward paging channel.

***RST** DEFAULT

Key Entry **Default** **User File**

Remarks A user-defined file can have a maximum length of 512 bytes.

Refer to "File Name Variables" on page 13 for information on the file name syntax.

[:FORWard]:FPCH:EBNO

Supported E4438C with Options 401 and 403

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPCH:EBNO <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPCH:EBNO?
```

This command sets the ratio of energy per bit to noise power spectral density (expressed in dB) for the forward paging channel.

***RST** +0.00000000E+000

Range

$$min\ EbNo: 10\log_{10}\left[\frac{\text{Chip Rate}}{1000(\text{Bit Rate})}\right] + \text{Normalized Power}$$

$$max\ EbNo: 10\log_{10}\left[\frac{1000(\text{Chip Rate})}{\text{Bit Rate}}\right] + \text{Normalized Power}$$

Normalized Power is the channel amplitude after adjusting the code power to 0 dB. Refer to "[:FORWard]:PADJust" on page 514 for adjusting the code domain power.

Field Entry EbNo

Remarks Changes to the EbNo values also change the EcNo values for all other channels in the current link (forward or reverse).

Queries of this command are only valid for the current operating state.

[:FORWard]:FPCH:LCMask

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPCH:LCMask?
```

This command outputs the contents of the long code mask field for the forward paging channel.

***RST** +0.00000000E+000

[:FORWard]:FPCH:LCMask:F1

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPCH:LCMask:F1 <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPCH:LCMask:F1?
```

This command sets the value of field one for the forward paging channel long code mask.

***RST** #H18CD

Range #H0–#H1FFF

Field Entry Field 1

[:FORWard]:FPCH:LCMask:F2

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPCH:LCMask:F2 <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPCH:LCMask:F2?
```

This command sets the value of field two for the forward paging channel long code mask.

***RST** #H00

Range #H00–#H1F

Field Entry `Field 2`

[:FORWard]:FPCH:LCMask:F3

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPCH:LCMask:F3 <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPCH:LCMask:F3?
```

This command sets the value of field three for the forward paging channel long code mask.

***RST** #H000

Range #H0–#HFFF

Field Entry `Field 3`

[:FORWard]:FPCH:MESSage

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPCH:MESSage <bit_count>,
<datablock>
```

This command sends a bit count and a data block (to queue up messaging), generated as a one-time paging message (asynchronous paging message), to the paging channel.

After a one-time paging message is generated, the signal generator reverts to synchronous paging file messages.

[:FORWard]:FPCH:POWer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPCH:POWer <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPCH:POWer?
```

Execute this command to set the power for the forward paging channel.

The variable <val> is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –40 to 0

Field Entry `Power`

[:FORWard]:FPCH:RATE

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPCH:RATE 4.8kbps|9.6kbps
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPCH:RATE?
```

This command sets the data rate for the forward paging channel.

The variable <val> is expressed in units of bits per second (bps–Mbps).

***RST** +9.60000000E+003

Field Entry `Bit Rate`

[:FORWard]:FPCH:WALSh

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPCH:WALSh <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPCH:WALSh?
```

This command sets the Walsh code for the forward paging channel.

***RST** +1

Range 0–63

Field Entry `Walsh`

[:FORWard]:FPCH[:STATe]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPCH[:STATe] ON|OFF|1|0
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPCH[:STATe]?
```

Execute this command to set the operating state for the forward paging channel.

***RST** 0

Field Entry `State`

[:FORWard]:FPICh:ECNO

Supported E4438C with Options 401 and 403

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPICh:ECNO <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPICh:ECNO?
```

This command sets the ratio of energy per chip to the noise power spectral density (expressed in dB) for the forward pilot channel.

***RST** +0.00000000E+000

Range min EcNo: –30 + Normalized Power

max EcNo: 30 + Normalized Power

Normalized Power is the channel amplitude after adjusting the code power to 0 dB. Refer to “[:FORWard]:PADJust” on page 514 for adjusting the code domain power.

Field Entry `EcNo`

Remarks Changes to the EcNo values also change the EbNo values for all other channels in the current link (forward or reverse).

Queries of this command are only valid for the current operating state.

[:FORWard]:FPICh:POWer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPICh:POWer <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPICh:POWer?
```

This command sets the power for the forward pilot channel.

The variable <val> is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –40 to 0

Field Entry `Power`

[:FORWard]:FPICh[:STATe]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPICh[:STATe] ON|OFF|1|0
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FPICh[:STATe]?
```

This command enables or disables the operating state of the forward pilot channel.

***RST** 1

Field Entry `State`

[:FORWard]:FSCH[1]|2:DATA

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:DATA PN9|PN15|FIX4|
"<file name>"|EXT
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:DATA?
```

This command configures the data field for the forward supplemental traffic channels.

***RST** PN9

Key Entry **PN9** **PN15** **FIX4** **User File** **EXT**

[:FORWard]:FSCH[1]|2:DATA:FIX4

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:DATA:FIX4 <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:DATA:FIX4?
```

This command selects a fixed 4-bit data pattern that repeats as necessary to fill the selected data area.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

[:FORWard]:FSCH[1]|2:EBNO

Supported E4438C with Options 401 and 403

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:EBNO <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:EBNO?
```

This command sets the ratio of energy per bit to noise power spectral density (expressed in dB) for the reverse access channel.

***RST** +0.00000000E+000

Range

$$\text{min EbNo: } 10\log_{10}\left[\frac{\text{Chip Rate}}{1000(\text{Bit Rate})}\right] + \text{Normalized Power}$$

$$\text{max EbNo: } 10\log_{10}\left[\frac{1000(\text{Chip Rate})}{\text{Bit Rate}}\right] + \text{Normalized Power}$$

Normalized Power is the channel amplitude after adjusting the code power to 0 dB. Refer to "[:FORWard]:PADJust" on page 514 for adjusting the code domain power.

Field Entry `EbNo`

Remarks Changes to the EbNo values also change the EcNo values for all other channels in the current link (forward or reverse).

Queries of this command are only valid for the current operating state.

[:FORWard]:FSCH[1]|2:FOFFset

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:FOFFset <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:FOFFset?
```

This command sets the frame offset value for the forward supplemental traffic channels.

***RST** +0

Range 0–15

Field Entry `Frame Offset`

Remarks Changing this value also changes the frame offset value for the forward fundamental channel (FFCH).

[:FORWard]:FSCH[1]|2:LCMask

Supported E4438C with Option 401

`[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:LCMask?`

This query outputs the contents of the long code mask field for the forward supplemental traffic channels.

***RST** 0

Remarks This value is shared with the forward fundamental channel (FFCH).

[:FORWard]:FSCH[1]|2:LCMask:ESN

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:LCMask:ESN <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:LCMask:ESN?
```

This command defines the permuted electronic serial number (ESN) for the long code mask, which is used to identify a particular mobile.

***RST** #H00000000

Range #H0–#HFFFFFFFF

Field Entry `Permuted ESN`

Remarks Changing this value also changes the permuted ESN for the long code mask in the forward fundamental channel (FFCH).

[:FORWard]:FSCH[1]|2:LCMask:HEADer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:LCMask:HEADer <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:LCMask:HEADer?
```

This command sets the header for the long code mask, which is used to identify a particular mobile.

***RST** #H318

Range 000–3FF

Field Entry `Header`

Remarks Changing this value also changes the header for the long code mask in the forward fundamental channel (FFCH).

[:FORWard]:FSCH[1]|2:POWer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:POWer <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:POWer?
```

This command sets the power for the forward supplemental traffic channels.

The variable <val> is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –40 to 0

Field Entry `Power`

[:FORWard]:FSCH[1]|2:QOF

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:QOF <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:QOF?
```

This command sets the quasi-orthogonal function value for the forward supplemental traffic channels.

***RST** +0

Range 0–3

Field Entry `QOF`

[:FORWard]:FSCH[1]|2:RATE

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:RATE 19.2kbps|
28.8kbps|38.4kbps|57.6kbps|76.8kbps|115.2kbps|153.6kbps|230.4kbps|
307.2kbps
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:RATE?
```

This command sets the data rate for the forward supplemental traffic channels.

***RST** +1.92000000E+004

Field Entry `Bit Rate`

Remarks Values preceded by an asterisk indicate data rate values that are eligible for turbo coding.

[:FORWard]:FSCH[1]|2:RCONfig

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:RCONfig 3|4|5
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:RCONfig?
```

This command sets the radio configuration value for the forward supplemental channels.

***RST** +3

Field Entry `Radio Config`

[:FORWard]:FSCH[1]|2:TCODe

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:TCODe ON|OFF|1|0
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:TCODe?
```

This command enables or disables the turbo coding operating state for the forward supplemental traffic channels.

***RST** 0

Field Entry `Turbo Coding`

Remarks Turbo coding is available for all data rates, excluding the following radio configurations (highest data rate of each radio configuration):

RC3: 153.6
RC4: 307.2
RC5: 230.4

To change the data rate for the forward supplemental traffic channel, refer to "[:FORWard]:FSCH[1]|2:RATE" on page 503.

[:FORWard]:FSCH[1]|2:WALSh

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:WALSh <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2:WALSh?
```

This command sets the Walsh code for the forward supplemental traffic channels.

***RST** FSCH1: 12 FSCH2: 14

Range	***RC3***	***RC4***	***RC5***
	Data Rate=19.2: 0–31 Data Rate=38.4: 0–15 Data Rate=76.8: 0–7 Data Rate=307.2: 0–3	Data Rate=19.2: 0–63 Data Rate=38.4: 0–31 Data Rate=76.8: 0–15 Data Rate=153.6: 0–7 Data Rate=307.2: 0–3	Data Rate=28.8: 0–31 Data Rate=57.6: 0–15 Data Rate=115.2: 0–7 Data Rate=230.4: 0–3

Field Entry `Walsh`

[:FORWard]:FSCH[1]|2[:STATe]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2[:STATe] ON|OFF|1|0
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSCH[1]|2[:STATe]?
```

This command enables or disables the operating state of the forward supplemental traffic channel.

***RST** 0

Field Entry `State`

[:FORWard]:FSYNc:CFRequency

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:CFRequency <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:CFRequency?
```

This command directs the mobile station to a CDMA channel having a primary paging channel.

***RST** +50

Range 0–2047

Field Entry `CDMA Freq`

[:FORWard]:FSYNc:DAYLt

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:DAYLt 1|0
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:DAYLt?
```

This command sets the daylight savings time offset for the forward synchronization channel, where 1 = on and 0 = off.

***RST** +0

Field Entry `DAYLT`

[:FORWard]:FSYNc:EBNO

Supported E4438C with Options 401 and 403

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:EBNO <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:EBNO?
```

This command sets the ratio of energy per bit to noise power spectral density (expressed in dB) for the quick paging channel.

***RST** +0.00000000E+000

Range

$$min\ EbNo: 10\log_{10}\left[\frac{\text{Chip Rate}}{1000(\text{Bit Rate})}\right] + \text{Normalized Power}$$

$$max\ EbNo: 10\log_{10}\left[\frac{1000(\text{Chip Rate})}{\text{Bit Rate}}\right] + \text{Normalized Power}$$

Normalized Power is the channel amplitude after adjusting the code power to 0 dB. Refer to “[:FORWard]:PADJust” on page 514 for adjusting the code domain power.

Field Entry `EbNo`

Remarks Changes to the EbNo values also change the EcNo values for all other channels in the current link (forward or reverse).

Queries of this command are only valid for the current operating state.

[:FORWard]:FSYNc:ECFRequency

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:ECFRequency <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:ECFRequency?
```

This command direct the mobile station to a CDMA channel having a primary paging channel. The mobile tunes to the `Ext CDMA Freq` field when it has a protocol revision level of 6 or greater, and it supports either the quick paging channel or radio configurations greater than 2. Otherwise, the mobile tunes to the `CDMA Freq` field for the CDMA channel.

This command sets the extended CDMA frequency for the forward synchronization channel.

***RST** +0

Range 0–2047

Field Entry `Ext CDMA Freq`

[:FORWard]:FSYNc:LPSec

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:LPSec <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:LPSec?
```

This command sets the leap seconds value for the forward synchronization channel.

***RST** +0

Range 0–255

Field Entry `Leap Seconds`

[:FORWard]:FSYNc:LTMoff

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:LTMoff <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:LTMoff?
```

This command sets the current local time offset from the basestation for the forward synchronization channel, where 1= 30 minutes, 2= 60 minutes, 3= 90 minutes, and so on.

***RST** +0

Range 0–63

Field Entry `LTM OFF`

[:FORWard]:FSYNc:MPREv

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:MPREv <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:MPREv?
```

This command sets the minimum protocol revision level for the forward synchronization channel.

***RST** +1

Range 0–255

Field Entry `P Rev Min`

[:FORWard]:FSYNc:MSGType

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:MSGType <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:MSGType?
```

This command sets the message type value for the forward synchronization channel.

***RST** +1

Range 0–255

Field Entry `Message Type`

[:FORWard]:FSYNc:NID

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:NID <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:NID?
```

This command sets the network identification value for the forward synchronization channel.

***RST** +1

Range 0–65535

Key Entry **Network ID**

[:FORWard]:FSYNc:POWer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:POWer <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:POWer?
```

This command sets the power for the forward synchronization channel.

The variable <val> is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –40 to 0

Field Entry `Power`

[:FORWard]:FSYNc:PRATe

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:PRATe <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:PRATe?
```

This command sets the base station paging rate for the forward supplemental channel.

***RST** +0

Range 0–3

Field Entry `PRAT`

[:FORWard]:FSYNc:PREV

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:PREV <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:PREV?
```

This command sets the protocol revision level for the forward synchronization channel.

***RST** +1

Range 0–255

Field Entry `P Rev`

[:FORWard]:FSYNc:RESErved

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:RESErved <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:RESErved?
```

This command sets the reserved field value for the forward synchronization channel.

***RST** +0

Range 0–7

Key Entry **Reserved**

Remarks Currently, base stations and mobiles ignore reserved bits, so the reserved field should be set to “0” with the query returning the same value.

[:FORWard]:FSYNc:SID

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:SID <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:SID?
```

This command sets the system identification for the forward synchronization channel.

***RST** +7

Range 0–32767

Field Entry `System ID`

[:FORWard]:FSYNc:STYPe

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:STYPe IS95|JSTD8|IS2000
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:STYPe?
```

This command selects the forward synchronization channel type.

IS95 This choice selects a channel type that is compatible with the IS95 CDMA standard.

JSTD8 This choice selects a channel type that is compatible with PCS CDMA standard personal station requirements for 1.9 to 2.0 GHz.

IS2000 This choice selects a channel type that is compatible with the IS2000 CDMA standard.

***RST** JSTD8

Key Entry **IS95** **JSTD8** **IS2000**

[:FORWard]:FSYNc:SYSTime

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:SYSTime <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:SYSTime?
```

This command sets the system time value for the forward synchronization channel.

***RST** #H000000000

Range #H0–#HFFFFFFFFF

Field Entry `Time`

[:FORWard]:FSYNc:WALSh

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:WALSh <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc:WALSh?
```

This command sets the Walsh code for the forward synchronization channel.

***RST** +32

Range 0–63

Field Entry `Walsh`

[:FORWard]:FSYNc[:STATe]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc[:STATe] ON|OFF|1|0
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:FSYNc[:STATe]?
```

This command enables or disables the operating state for the forward synchronization channel.

***RST** 0

Field Entry `State`

[:FORWard]:NOISe:CN

Supported E4438C with Options 401 and 403

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:NOISe:CN <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:NOISe:CN?
```

This command sets the carrier to noise ratio for the forward link.

The variable <val> is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –30 to 30

Key Entry **C/N**

Remarks The carrier to noise ratio is the ratio of the carrier power to in-channel noise power.

A change to the carrier to noise ratio will change all EbNo/EcNo field values.

[:FORWard]:NOISe[:STATe]

Supported E4438C with Options 401 and 403

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:NOISe[:STATe] ON|OFF|1|0
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:NOISe[:STATe]?
```

This command enables or disables the noise function for the CDMA2000 baseband forward link.

NOTE When this command is enabled, an immediate increase in the Even Second Delay value will occur. The Even Second Delay value will increase by an increment of 11.5 chips. The chip increase will be seen in the appropriate fields on the display.

Changes to Even Second Delay and Trigger Advance will not affect synchronization; automatic compensation is performed internally.

***RST** 0

Key Entry **Noise Off On**

Remarks Both the carrier and noise power value will be adjusted to match the specified carrier to noise ratio. Refer to "[:FORWard]:NOISe:CN" on page 511 to change the carrier to noise ratio.

The noise function can only be turned on with Option 403 installed.

[:FORWard]:OCNS:EBNO

Supported E4438C with Options 401 and 403

```
[:SOURce]:RADio[1]|2|3|4:CDMA2000[:BBG][:FORWard]:OCNS:EBNO <val>
[:SOURce]:RADio[1]|2|3|4:CDMA2000[:BBG][:FORWard]:OCNS:EBNO?
```

This command sets the energy per bit to noise power (EbNo) density ratio for the forward link orthogonal channel noise simulator (OCNS).

The variable <val> is expressed in units of decibels (dB).

Range

$$\text{min EbNo: } 10\log_{10}\left(\frac{\text{Chip Rate}}{1000(\text{Bit Rate})}\right) + \text{Normalized Power}$$

$$\text{max EbNo: } 10\log_{10}\left(\frac{1000(\text{Chip Rate})}{\text{Bit Rate}}\right) + \text{Normalized Power}$$

The OCNS bit rate is fixed at 19.2 kilo-bits per second.

The Normalized Power is the channel amplitude after adjusting the code domain power to 0 dB. Refer “[:FORWard]:PADJust” on page 514.

Range

$$\text{min EbNo: } 10\log_{10}\left(\frac{\text{Chip Rate}}{1000(\text{Bit Rate})}\right) + \text{Normalized Power}$$

$$\text{max EbNo: } 10\log_{10}\left(\frac{1000(\text{Chip Rate})}{\text{Bit Rate}}\right) + \text{Normalized Power}$$

The OCNS bit rate is fixed at 19.2 kilo-bits per second.

The Normalized Power is the channel amplitude after adjusting the code domain power to 0 dB. Refer “[:FORWard]:PADJust” on page 514.

Field Entry `EbNo`

Remarks EbNo is available for all channels except the pilot channel.

The noise function must be turned on for this setting to work. Refer to “[:FORWard]:NOISe[:STATe]” on page 512 for turning on the noise.

[:FORWard]:OCNS:POWer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:OCNS:POWer <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:OCNS:POWer?
```

This command sets the power level for the orthogonal channel noise simulator.

The variable <val> is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –40 to 0

Field Entry `Power`

[:FORWard]:OCNS:WALSh

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:OCNS:WALSh <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:OCNS:WALSh?
```

This command sets the Walsh code for the orthogonal channel noise simulator.

***RST** +61

Range 0–63

Field Entry `Walsh`

[:FORWard]:OCNS[:STATe]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:OCNS[:STATe] ON|OFF|1|0
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:OCNS[:STATe]?
```

This command turns the orthogonal channel noise simulator on or off.

***RST** 0

Field Entry `State`

[:FORWard]:PADJust

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:PADJust EQUal|SCALe
```

This command sets the code domain power (the relative power in each of the channels).

EQUal Sets all channels to equal power, and the total power to 0 dB.

SCALe Scales all of the current channel powers so that the total power equals 0 dB, keeping the previous power ratios between the individual channels.

Key Entry **Equal Powers** **Scale To 0dB**

[:FORWard]:POLarity

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:POLarity NORMal|INVerted
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:POLarity?
```

This command sets the rotation direction for the phase modulation vector.

NORMal This choice selects normal phase polarity.

INVerted This choice inverts the internal Q signal.

***RST** NORM

Field Entry `Phase Polarity`

[:FORWard]:QPCH:CCI

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:QPCH:CCI <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:QPCH:CCI?
```

This command selects the configuration change indicator for the quick paging channel.

***RST** +3

Range 0–3

Field Entry `Change`

[:FORWard]:QPCH:EBNO

Supported E4438C with Options 401 and 403

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:QPCH:EBNO <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:QPCH:EBNO?
```

This command sets the ratio of energy per bit to noise power spectral density (expressed in dB) for the quick paging channel.

***RST** +0.00000000E+000

Range

$$min\ EbNo\text{: } 10\log_{10}\left[\frac{\text{Chip Rate}}{1000(\text{Bit Rate})}\right] + \text{Normalized Power}$$

$$max\ EbNo\text{: } 10\log_{10}\left[\frac{1000(\text{Chip Rate})}{\text{Bit Rate}}\right] + \text{Normalized Power}$$

Normalized Power is the channel amplitude after adjusting the code power to

0 dB. Refer to "[:FORWard]:PADJust" on page 514 for adjusting the code domain power.

Field Entry EbNo

Remarks Changes to the EbNo values also change the EcNo values for all other channels in the current link (forward or reverse).

Queries of this command are only valid for the current operating state.

[:FORWard]:QPCH:PI

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:QPCH:PI <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:QPCH:PI?
```

This command selects the paging slots for the quick paging channel.

***RST** +0

Field Entry Paging Indicator

Remarks When the bit rate is 2400, a value of 191 turns all paging slots on.

When the bit rate is 4800, a value of 383 turns all paging slots on.

When the bit rate is either 2400 or 4800, a value of –1 turns all paging slots off.

To change the bit rate value, refer to "[:FORWard]:QPCH:RATE" on page 517.

[:FORWard]:QPCH:POWer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:QPCH:POWer <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:QPCH:POWer?
```

This command sets the power value for the quick paging channel.

The variable <val> is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –40 to 0

Field Entry Power

[:FORWard]:QPCH:RATE

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:QPCH:RATE 2.4kbps|4.8kbps
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:QPCH:RATE?
```

This command sets the bit rate for the quick paging channel.

***RST** +4.80000000E+003

Field Entry `Bit Rate`

[:FORWard]:QPCH:WALSh

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:QPCH:WALSh <val>
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:QPCH:WALSh?
```

This command sets the Walsh code for the quick paging channel.

***RST** +80

Range 0–127

Field Entry `Walsh`

[:FORWard]:QPCH[:STATe]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:QPCH[:STATe] ON|OFF|1|0
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:QPCH[:STATe]?
```

This command enables or disables the operating state of the quick paging channel.

***RST** 0

Field Entry `State`

[:FORWard]:SRATe

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:FORWard]:SRATe?
```

This command returns the value of the current spreading rate.

***RST** +1

:PNOFfset

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:PNOffset <val>
[:SOURce]:RADio:CDMA2000[:BBG]:PNOFfset?
```

This command sets the current pseudorandom number (PN) offset value.

***RST** +1

Range 0–511

Field Entry `PN Offset`

Remarks The PN offset value is the time offset in the short code assigned to each basestation, allotting a unique identity for each.

:REVerse:BBCLock

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:BBCLock INT[1]|EXT[1]
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:BBCLock?
```

This command selects the data clock source.

***RST** INT

Key Entry **Internal** **External**

Remarks If the EXT choice is selected, the REFerence selection will automatically be set to internal. The external data clock source must be connected to the DATA CLOCK front panel BNC input connector, and its frequency must match the specified chip rate.

:REVerse:CHIPrate

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:CHIPrate <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:CHIPrate?
```

Execute this command to adjust the chip rate.

The variable <val> is expressed in units of chips per second (cps–Mcps).

***RST** +1.22880000E+006

Range 1E3–1.3E6

Field Entry `Chip Rate`

Remarks The default value (1.228800 Mcps) is in accordance with the IS-2000 specification.

:REVerse:ESDelay

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:ESDelay <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:ESDelay?
```

This command modifies the even second clock pulse.

***RST** +2.75000000E+001

Range 0.5–128.0

Field Entry `Even Second Delay`

Remarks The even second clock pulse sets the delay to align the RF with the trigger.

When the noise function is set to ON, this value will increase. Refer to ":REVerse:NOISe[:STATe]" on page 524 for more information.

:REVerse:FILTer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:FILTer RNYQuist|NYQuist|GAUSsian|
RECTangle|IS95|IS95_EQ|IS95_MOD|IS95_MOD_EQ|AC4Fm|UGGaussian|
"<user FIR>"
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:FILTer?
```

This command specifies the filter type for the reverse link.

IS95 This choice selects a filter that meets the criteria of the IS-95 standard.

IS95_EQ This choice selects a filter which is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard. This filter is only used for IS-95 baseband filtering.

IS95_MOD This choice selects a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.

IS95_MOD_EQ This choice selects a filter which is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance), with lower passband rejection.

AC4Fm This choice selects a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.

UGGaussian This choice selects a backwards compatible GSM Gaussian filter (Gaussian filter with a fixed BbT value of 0.300) for the ESG E44xxB Option UN3 or UN4.

"<user FIR>" This variable is any filter file that you have stored into memory.

***RST** IS95

Key Entry **Root Nyquist** **Nyquist** **Gaussian** **Rectangle** **IS-95** **IS-95 w/EQ** **IS-95 Mod** **IS-95 MOD w/EQ** **APCO 25 C4FM** **UN3/4 GSM Gaussian** **User FIR**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:REVerse:FILTer:ALPHa

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:FILTer:ALPHa <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:FILTer:ALPHa?
```

This command changes the alpha value on the Nyquist or root Nyquist filter.

The filter alpha value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +2.20000000E–001

Range 0.000–1.000

Key Entry **Filter Alpha**

Remarks This command is effective only after choosing the root Nyquist or Nyquist filter. It does not effect other types of filters.

To change the current filter type, refer to ":REVerse:FILTer" on page 520.

:REVerse:FILTer:BBT

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:FILTer:BBT <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:FILTer:BBT?
```

This command changes the bandwidth-multiplied-by-bit-time filter value.

The filter BbT value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +5.00000000E–001

Range 0.500–1.000

Key Entry **Filter BbT**

Remarks This command is effective only after choosing the Gaussian filter. It does not effect other types of filters.

To change the current filter type, refer to ":REVerse:FILTer" on page 520.

:REVerse:FILTer:CHANnel

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:FILTer:CHANnel EVM|ACP
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:FILTer:CHANnel?
```

This command optimizes the Nyquist and root Nyquist filters to minimize error vector magnitude (EVM) or to minimize adjacent channel power (ACP).

EVM This choice provides the most ideal passband.

ACP This choice improves stopband rejection.

***RST** EVM

Key Entry **Optimize FIR For EVM ACP**

Remarks To change the current filter type, refer to ":REVerse:FILTer" on page 520.

:REVerse:LCMask

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:LCMask <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:LCMask?
```

This command specifies a unique serial number code to identify a mobile station.

***RST** #H00000000000

Range #H0–#H3FFFFFFFFFF

Field Entry `Long Code Mask`

:REVerse:LCSTate

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:LCSTate <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:LCSTate?
```

This command sets a unique code to address a mobile station.

***RST** #H00000000000

Range #H0–#H3FFFFFFFFFF

Field Entry `Long Code State`

Remarks The storage register for the long code state allows a 42-bit binary number to be entered.

:REVerse:PADJust

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:PADJust EQUal|SCALe
```

Execute this command to set the code domain power.

EQUal Sets all channels to equal power, and the total power to 0 dB.

SCALe Scales all of the current channel powers so that the total power equals 0 dB, keeping the previous power ratios between the individual channels.

Key Entry **Equal Powers** **Scale To 0dB**

:REVerse:POLarity[:ALL]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:POLarity[:ALL] NORMal|INVerted
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:POLarity[:ALL]?
```

This command sets the phase polarity to either normal or inverted.

NORMal This choice selects normal phase polarity.

INVerted This choice inverts the internal Q signal.

***RST** NORM

Key Entry **Normal** **Inverted**

:REVerse:NOISe:CN

Supported E4438C with Options 401 and 403

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:NOISe:CN <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:NOISe:CN?
```

This command sets the carrier to noise ratio for the reverse link.

The variable <val> is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –30 to 30

Key Entry C/N

Remarks The carrier to noise ratio is the ratio of the carrier power to in-channel noise power, expressed in decibels (dB).

A change to the carrier to noise ratio will only align the EbNo/EcNo field values in the active operating mode.

:REVerse:NOISe[:STATe]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:NOISe[:STATe] ON|OFF|1|0
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:NOISe[:STATe]?
```

This command enables or disables the noise function for the baseband reverse link.

NOTE When this command is enabled, an immediate increase in the Even Second Delay and Trigger Advance values will occur. The Even Second Delay value will increase by an increment of 11.5 chips and the Trigger Advance value will increase by an increment of 12 chips. The chip increase will be seen in the appropriate field on the display.

Changes to Even Second Delay and Trigger Advance will not affect synchronization; automatic compensation is performed internally.

***RST** 0

Key Entry **Noise Off On**

Remarks Both the carrier and noise power value will be adjusted to match the specified carrier to noise ratio. Refer to ":REVerse:NOISe:CN" on page 523 to change the carrier to noise ratio.

The noise function can only be turned on with Option 403 installed.

:REVerse:RC12:ACCess:RACH:DATA

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:ACCess:RACH:DATA PN9|PN15|
FIX4|"<file name>"
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:ACCess:RACH:DATA?
```

Execute this command to configure the data field for the reverse access channel.

***RST** PN9

Key Entry **PN9** **PN15** **FIX4** **User File**

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:REVerse:RC12:ACCess:RACH:DATA:FIX4

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:ACCess:RACH:DATA:FIX4 <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:ACCess:RACH:DATA:FIX4?
```

This command selects a fixed 4-bit data pattern to be repeated as necessary to fill the selected data area.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry FIX4

:REVerse:RC12:ACCess:RACH:EBNO

Supported E4438C with Options 401 and 403

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:ACCess:RACH:EBNO <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:ACCess:RACH:EBNO?
```

This command sets the ratio of energy per bit to noise power spectral density (expressed in dB) for the reverse access channel.

***RST** +0.00000000E+000

Range

$$min\ EbNo: 10\log_{10}\left[\frac{\text{Chip Rate}}{1000(\text{Bit Rate})}\right] + \text{Normalized Power}$$

$$max\ EbNo: 10\log_{10}\left[\frac{1000(\text{Chip Rate})}{\text{Bit Rate}}\right] + \text{Normalized Power}$$

Normalized Power is the channel amplitude after adjusting the code power to 0 dB. Refer to “:REVerse:PADJust” on page 523 for adjusting the code domain power.

Field Entry `EbNo`

Remarks Changes to the EbNo values also change the EcNo values for all other channels in the current link (forward or reverse).

Queries of this command are only valid for the current operating state.

:REVerse:RC12:ACCess:RACH:FLENgth

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:ACCess:RACH:FLENgth?
```

This command queries the frame length for the reverse access channel.

The frame length is expressed as seconds (ms).

***RST** +20

Field Entry `Frame Length`

:REVerse:RC12:ACCess:RACH:FOFFset

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:ACCess:RACH:FOFFset <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:ACCess:RACH:FOFFset?
```

This command sets the frame offset value for the reverse access channel.

***RST** +0

Range 0–15

Field Entry `Frame Offset`

:REVerse:RC12:ACCess:RACH:POWer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:ACCess:RACH:POWer <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:ACCess:RACH:POWer?
```

This command sets the power for the reverse access channel.

The variable <val> is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –40 to 0

Field Entry `Power`

:REVerse:RC12:ACCess:RACH:RCONfig

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:ACCess:RACH:RCONfig 1|2
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:ACCess:RACH:RCONfig?
```

This command select the radio configuration value for the reverse access channel.

***RST** +1

Field Entry `Radio Config`

:REVerse:RC12:ACCess:RACH:RATE

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:ACCess:RACH:RATE?
```

This command queries the data rate for the reverse access channel.

***RST** +4.80000000E+003

Field Entry `Bit Rate`

:REVerse:RC12:ACCess:RACH[:STATe]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:ACCess:RACH[:STATe] ON|OFF|
1|0
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:ACCess:RACH[:STATe]?
```

This command enables or disables the operating state for the reverse access channel.

***RST** +1

Field Entry `State`

:REVerse:RC12:TRAFfic:RSCH:DATA

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:TRAFfic:RSCH:DATA PN9|PN15|
FIX4|"<file name>"
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:TRAFfic:RSCH:DATA?
```

This command configures the data field for the reverse supplemental traffic channel.

***RST** PN9

Key Entry **PN9** **PN15** **FIX4** **User File**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:REVerse:RC12:TRAFfic:RSCH:DATA:FIX4

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:TRAFfic:RSCH:DATA:FIX4 <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:TRAFfic:RSCH:DATA:FIX4?
```

This command sets a fixed 4-bit data pattern that repeats as necessary to fill the selected data area.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

:REVerse:RC12:TRAFfic:RSCH:FLENgth

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:TRAFfic:RSCH:FLENgth?
```

This command queries the frame length value for the reverse supplemental traffic channel.

***RST** +20

:REVerse:RC12:TRAFfic:RSCH:FOFFset

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:TRAFfic:RSCH:FOFFset <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:TRAFfic:RSCH:FOFFset?
```

This command sets the frame offset value for the reverse supplemental traffic channel.

***RST** +0

Range 0–15

Field Entry `Frame Offset`

:REVerse:RC12:TRAFfic:RSCH:POWer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:TRAFfic:RSCH:POWer <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:TRAFfic:RSCH:POWer?
```

This command sets the power for the reverse supplemental traffic channel.

The variable <val> is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –40 to 0

Field Entry `Power`

:REVerse:RC12:TRAFfic:RSCH:RATE

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:TRAFfic:RSCH:RATE 1.2kbps|
1.8kbps|2.4kbps|3.6kbps|4.8kbps|7.2kbps|9.6kbps|14.4kbps
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:TRAFfic:RSCH:RATE?
```

This command sets the data rate for the reverse supplemental traffic channel.

***RST** +9.60000000E+003

Field Entry `Bit Rate`

:REVerse:RC12:TRAFfic:RSCH:RCONfig

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:TRAFfic:RSCH:RCONfig 1|2
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:TRAFfic:RSCH:RCONfig?
```

This command sets the data rate for the reverse supplemental traffic channel.

***RST** +1

Field Entry `Radio Config`

:REVerse:RC12:TRAFfic:RSCH[:STATe]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:TRAFfic:RSCH[:STATe] ON|OFF|
1|0
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC12:TRAFfic:RSCH[:STATe]?
```

This command sets the operating state for the reverse supplemental traffic channel.

***RST** 0

Field Entry `State`

:REVerse:RC34:CCONtrol:RCCCh:DATA

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RCCCh:DATA PN9|
PN15|FIX4|"<file name>"
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RCCCh:DATA?
```

This command configures the data field for the reverse common control channel.

***RST** PN9

Key Entry **PN9** **PN15** **FIX4** **User File**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:REVerse:RC34:CCONtrol:RCCCh:DATA:FIX4

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RCCCh:DATA:
FIX4 <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RCCCh:DATA:FIX4?
```

This command selects a fixed 4-bit data pattern to be repeated as necessary to fill the selected data area.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

:REVerse:RC34:CCONtrol:RCCCh:EBNO

Supported E4438C with Options 401 and 403

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RCCCh:EBNO <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RCCCh:EBNO?
```

This command sets the ratio of energy per bit to noise power spectral density (expressed in dB) for the reverse common control channel.

***RST** +0.00000000E+000

Range

$$min\ EbNo\text{: } 10\log_{10}\left[\frac{\text{Chip Rate}}{1000(\text{Bit Rate})}\right] + \text{Normalized Power}$$

$$max\ EbNo\text{: } 10\log_{10}\left[\frac{1000(\text{Chip Rate})}{\text{Bit Rate}}\right] + \text{Normalized Power}$$

Normalized Power is the channel amplitude after adjusting the code power to 0 dB. Refer to ":REVerse:PADJust" on page 523 for adjusting the code domain power.

Field Entry `EbNo`

Remarks Changes to the EbNo values also change the EcNo values for all other channels in the current link (forward or reverse).

Queries of this command are only valid for the current operating state.

:REVerse:RC34:CCONtrol:RCCCh:FLENgth

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RCCCh:FLENgth 5|10|
20
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RCCCh:FLENgth?
```

This command sets the frame length value for the reverse common control channel.

The frame length is expressed as seconds (ms).

***RST** +20

Field Entry `Frame Length`

:REVerse:RC34:CCONtrol:RCCCh:FOFFset

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RCCCh:FOFFset <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RCCCh:FOFFset?
```

This command sets the frame offset value for the reverse common control channel.

The frame offset value is expressed as seconds (ms).

***RST** +0

Range

Frame Length=5:	0–3
Frame Length=10:	0–7
Frame Length=20:	0–20

Field Entry `Frame Offset`

:REVerse:RC34:CCONtrol:RCCCh:POWer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RCCCh:POWer <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RCCCh:POWer?
```

This command sets the power for the reverse common control channel.

The variable <val> is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –40 to 0

Field Entry `Power`

:REVerse:RC34:CCONtrol:RCCCh:RCONfig

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RCCCh:RCONfig 3|4
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RCCCh:RCONfig?
```

This command selects the radio configuration value for the reverse common control channel.

***RST** +3

Field Entry `Radio Config`

:REVerse:RC34:CCONtrol:RCCCh:RATE

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RCCCh:RATE 9.6kbps|
19.2kbps|38.4kbps
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RCCCh:RATE?
```

This command adjusts the data rate value for the reverse common control channel.

***RST** +9.60000000E+003

Field Entry `Bit Rate`

:REVerse:RC34:CCONtrol:RCCCh:WALSh

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RCCCh:WALSh?
```

This command queries the Walsh code for the reverse common control channel.

***RST** +2

Field Entry `Walsh`

:REVerse:RC34:CCONtrol:RCCCh[:STATe]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RCCCh[:STATe] ON|
OFF|1|0
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RCCCh[:STATe]?
```

This command sets the operating state for the reverse common control channel.

***RST** 0

Field Entry `State`

:REVerse:RC34:CCONtrol:RPICh:ECNO

Supported E4438C with Options 401 and 403

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RPICh:ECNO <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RPICh:ECNO?
```

This command sets the ratio of energy per chip to the noise power spectral density (expressed in dB) for the reverse common control pilot channel.

***RST** +0.00000000E+000

Range min EcNo: –30 + Normalized Power

max EcNo: 30 + Normalized Power

Normalized Power is the channel amplitude after adjusting the code power to 0 dB. Refer to ":REVerse:PADJust" on page 523 for adjusting the code domain power.

Field Entry `EcNo`

Remarks Changes to the EcNo values also change the EbNo values for all other channels in the current link (forward or reverse).

Queries of this command are only valid for the current operating state.

:REVerse:RC34:CCONtrol:RPICh:GRATe

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RPICh:GRATe FULL|
HALF|QUARter
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RPICh:GRATe?
```

This command configures the gating data field for the reverse common control pilot channel.

FULL This choice transmits all sixteen power control bits.

HALF This choice transmits eight power control bits.

QUARter This choice transmits four power control bits.

***RST** FULL

Key Entry **Full** **Half** **Quarter**

:REVerse:RC34:CCONtrol:RPICh:POWer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RPICh:POWer <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RPICh:POWer?
```

This command sets the power for the reverse common control pilot channel.

The variable <val> is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –40 to 0

Field Entry `Power`

:REVerse:RC34:CCONtrol:RPICh:WALSh

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RPICh:WALSh?
```

This command queries the Walsh code for the reverse common control pilot channel.

***RST** +0

Field Entry `Walsh`

:REVerse:RC34:CCONtrol:RPICh[:STATe]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RPICh[:STATe] ON|
OFF|1|0
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:CCONtrol:RPICh[:STATe]?
```

This command sets the operating state for the reverse common control pilot channel.

***RST** 1

Field Entry `State`

:REVerse:RC34:EACCess:REACh:DATA

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:REACh:DATA PN9|PN15|
FIX4|"<file name>"
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:REACh:DATA?
```

This command configures the data field for the reverse enhanced access channel.

***RST** PN9

Key Entry **PN9** **PN15** **FIX4** **User File**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:REVerse:RC34:EACCess:REACh:DATA:FIX4

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:REACh:DATA:
FIX4 <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:REACh:DATA:FIX4?
```

This command selects a fixed 4-bit data pattern to be repeated as necessary to fill the selected data area.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

:REVerse:RC34:EACCess:REACh:EBNO

Supported E4438C with Options 401 and 403

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:REACh:EBNO <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:REACh:EBNO?
```

This command sets the ratio of energy per bit to noise power spectral density (expressed in dB) for the reverse enhanced access channel.

***RST** +0.00000000E+000

Range

$$min\ EbNo: 10\log_{10}\left[\frac{\text{Chip Rate}}{1000(\text{Bit Rate})}\right] + \text{Normalized Power}$$

$$max\ EbNo: 10\log_{10}\left[\frac{1000(\text{Chip Rate})}{\text{Bit Rate}}\right] + \text{Normalized Power}$$

Normalized Power is the channel amplitude after adjusting the code power to 0 dB. Refer to ":REVerse:PADJust" on page 523 for adjusting the code domain power.

Field Entry `EbNo`

Remarks Changes to the EbNo values also change the EcNo values for all other channels in the current link (forward or reverse).

Queries of this command are only valid for the current operating state.

:REVerse:RC34:EACCess:REACh:FOFFset

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:REACh:FOFFset <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:REACh:FOFFset?
```

This command sets the frame offset value for the reverse enhanced access channel.

***RST** +0

Range

Frame Length=5:	0–3	Frame Length=10:	0–7
Frame Length=20:	0–15		

Field Entry `Frame Offset`

:REVerse:RC34:EACCess:REACh:POWer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:REACh:POWer <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:REACh:POWer?
```

This command sets the power level for the reverse enhanced access channel.

The variable <val> is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –40 to 0

Field Entry `Power`

:REVerse:RC34:EACCess:REACh:RCONfig

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:REACh:RCONfig 3|4
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:REACh:RCONfig?
```

This command sets the radio configuration for the reverse enhanced access channel.

***RST** +3

Field Entry `Radio Config`

:REVerse:RC34:EACCess:REACh:RATE

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:REACh:RATE 9.6kbps|
19.2kbps|38.4kbps
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:REACh:RATE?
```

This command adjusts the data rate value for the reverse enhanced access channel.

***RST** +9.60000000E+003

Field Entry `Bit Rate`

:REVerse:RC34:EACCess:REACh:WALSh

Supported E4438C with Option 401

`[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:REACh:WALSh?`

This command queries the Walsh code for the reverse enhanced access channel.

***RST** +2

Field Entry `Walsh`

:REVerse:RC34:EACCess:REACh[:STATe]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:REACh[:STATe] ON|
OFF|1|0
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:REACh[:STATe]?
```

This command sets the operating state for the reverse enhanced access channel.

***RST** 0

Field Entry `State`

:REVerse:RC34:EACCess:RPICh:ECNO

Supported E4438C with Options 401 and 403

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:RPICh:ECNO <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:RPICh:ECNO?
```

This command sets the ratio of energy per chip to the noise power spectral density (expressed in dB) for the reverse enhanced access pilot channel.

***RST** +0.00000000E+000

Range min EcNo: –30 + Normalized Power

max EcNo: 30 + Normalized Power

Normalized Power is the channel amplitude after adjusting the code power to 0 dB. Refer to ":REVerse:PADJust" on page 523 for adjusting the code domain power.

Field Entry `EcNo`

Remarks Changes to the EcNo values also change the EbNo values for all other channels in the current link (forward or reverse).

Queries of this command are only valid for the current operating state.

:REVerse:RC34:EACCess:RPICh:GRATe

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:RPICh:GRATe FULL|
HALF|QUARter
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:RPICh:GRATe?
```

This command configures the gating data field for the reverse enhanced access pilot channel.

FULL	This choice transmits all sixteen power control bits.
HALF	This choice transmits eight power control bits.
QUARter	This choice transmits four power control bits.
***RST**	FULL
Key Entry	**Full** **Half** **Quarter**

:REVerse:RC34:EACCess:RPICh:POWer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:RPICh:POWer <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:RPICh:POWer?
```

This command sets the power for the reverse enhanced access pilot channel.

The variable <val> is expressed in unit of decibels (dB).

***RST**	+0.00000000E+000
Range	–40 to 0
Field Entry	`Power`

:REVerse:RC34:EACCess:RPICh:WALSh

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:RPICh:WALSh?
```

This command queries the Walsh code for the reverse enhanced access pilot channel.

***RST**	+0
Field Entry	`Walsh`

:REVerse:RC34:EACCess:RPICh[:STATe]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:RPICh[:STATe] ON|
OFF|1|0
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:EACCess:RPICh[:STATe]?
```

This command sets the operating state for the reverse enhanced access pilot channel.

***RST** 1

Field Entry `State`

:REVerse:RC34:TRAFfic:RDCCh:DATA

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RDCCh:DATA PN9|
PN15|FIX4|"<file name>"
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RDCCh:DATA?
```

This command configures the data field for the reverse traffic dedicated control channel.

***RST** PN9

Key Entry **PN9** **PN15** **FIX4** **User File**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:REVerse:RC34:TRAFfic:RDCCh:DATA:FIX4

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RDCCh:DATA:
FIX4 <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RDCCh:DATA:FIX4?
```

This command selects a fixed 4-bit data pattern to be repeated as necessary to fill the selected data area.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

:REVerse:RC34:TRAFfic:RDCCh:EBNO

Supported E4438C with Options 401 and 403

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RDCCh:EBNO <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RDCCh:EBNO?
```

This command sets the ratio of energy per bit, per the noise power spectral density (expressed in dB) for the reverse traffic dedicated control channel.

***RST** +0.00000000E+000

Range

$$\text{min EbNo: } 10\log_{10}\left[\frac{\text{Chip Rate}}{1000(\text{Bit Rate})}\right] + \text{Normalized Power}$$

$$\text{max EbNo: } 10\log_{10}\left[\frac{1000(\text{Chip Rate})}{\text{Bit Rate}}\right] + \text{Normalized Power}$$

Normalized Power is the channel amplitude after adjusting the code power to 0 dB. Refer to ":REVerse:PADJust" on page 523 for adjusting the code domain power.

Field Entry `EbNo`

Remarks Changes to the EbNo values also change the EcNo values for all other channels in the current link (forward or reverse).

Queries of this command are only valid for the current operating state.

:REVerse:RC34:TRAFfic:RDCCh:FLENgth

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RDCCh:FLENgth 5|20
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RDCCh:FLENgth?
```

This command sets the frame length value for the reverse traffic dedicated control channel.

The frame length is expressed as seconds (ms).

***RST** +20

Field Entry `Frame Length`

:REVerse:RC34:TRAFfic:RDCCh:FOFFset

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RDCCh:FOFFset <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RDCCh:FOFFset?
```

This command sets the frame offset value for the reverse traffic dedicated control channel.

***RST**	+0			
Range	Frame Length=5:	0–3	Frame Length=20:	0–7
Field Entry	`Frame Offset`			

:REVerse:RC34:TRAFfic:RDCCh:POWer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RDCCh:POWer <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RDCCh:POWer?
```

This command sets the power for the reverse traffic dedicated control channel.

The variable <val> is expressed in units of decibels (dB).

***RST**	+0
Range	–40 to 0
Field Entry	`Power`

:REVerse:RC34:TRAFfic:RDCCh:RATE

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RDCCh:RATE?
```

This command queries the data rate for the reverse traffic dedicated control channel.

***RST**	Frame Length=5:	RC3/4= +9.60000000E+003
	Frame Length=10:	RC3= +9.60000000E+003
	Frame Length=20:	RC3= +1.44000000E+004
Field Entry	`Bit Rate`	

:REVerse:RC34:TRAFfic:RDDCh:RCONfig

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RDDCh:RCONfig 3|4
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RDDCh:RCONfig?
```

This command selects the radio configuration value for the reverse traffic dedicated control channel.

***RST**	+3
Field Entry	`Radio Config`

:REVerse:RC34:TRAFfic:RDCCh:WALSh

Supported E4438C with Option 401

`[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RDCCh:WALSh?`

This command queries the Walsh code for the reverse traffic dedicated control channel.

***RST** +8

Range 0–15

Field Entry `Walsh`

:REVerse:RC34:TRAFfic:RDCCh[:STATe]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RDCCh[:STATe] ON|
OFF|1|0
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RDCCh[:STATe]?
```

This command sets the operating state for the reverse traffic dedicated control channel.

***RST** 0

Field Entry `State`

:REVerse:RC34:TRAFfic:RFCH:DATA

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RFCH:DATA PN9|PN15|
FIX4|"<file name>"
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RFCH:DATA?
```

This command configures the data field for the reverse fundamental traffic channel.

***RST** PN9

Key Entry **PN9** **PN15** **FIX4** **User File**

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:REVerse:RC34:TRAFfic:RFCH:DATA:FIX4

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RFCH:DATA:FIX4 <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RFCH:DATA:FIX4?
```

This command selects a fixed 4-bit data pattern to be repeated as necessary to fill the selected data area.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

:REVerse:RC34:TRAFfic:RFCH:EBNO

Supported E4438C with Options 401 and 403

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RFCH:EBNO <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RFCH:EBNO?
```

This command sets the ratio of energy per bit, per the noise power spectral density (expressed in dB) for the reverse fundamental traffic channel.

***RST** +0.00000000E+000

Range

$$min\ EbNo\text{: } 10\log_{10}\left[\frac{\text{Chip Rate}}{1000(\text{Bit Rate})}\right] + \text{Normalized Power}$$

$$max\ EbNo\text{: } 10\log_{10}\left[\frac{1000(\text{Chip Rate})}{\text{Bit Rate}}\right] + \text{Normalized Power}$$

Normalized Power is the channel amplitude after adjusting the code power to 0 dB. Refer to ":REVerse:PADJust" on page 523 for adjusting the code domain power.

Field Entry `EbNo`

Remarks Changes to the EbNo values also change the EcNo values for all other

channels in the current link (forward or reverse).

Queries of this command are only valid for the current operating state.

:REVerse:RC34:TRAFfic:RFCH:FLENgth

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RFCH:FLENgth 5|20
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RFCH:FLENgth?
```

This command sets the frame length value for the reverse fundamental traffic channel.

The frame length is expressed as seconds (ms).

***RST** +20

Field Entry `Frame Length`

:REVerse:RC34:TRAFfic:RFCH:FOFFset

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RFCH:FOFFset <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RFCH:FOFFset?
```

This command sets the frame offset value for the reverse fundamental traffic channel.

***RST** +0

Range Frame Length=5: 0–3
Frame Length=20: 0–15

Field Entry `Frame Offset`

:REVerse:RC34:TRAFfic:RFCH:POWer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RFCH:POWer <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RFCH:POWer?
```

This command sets the power for the reverse fundamental traffic channel.

The variable <val> is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –40 to 0

Field Entry `Power`

:REVerse:RC34:TRAFfic:RFCH:RCONfig

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RFCH:RCONfig 3|4
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RFCH:RCONfig?
```

This command sets the radio configuration value for the reverse fundamental traffic channel.

***RST** +3

Field Entry `Radio Config`

:REVerse:RC34:TRAFfic:RFCH:RATE

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RFCH:RATE 1.2kbps|
1.5kbps|1.8kbps|2.7kbps|3.6kbps|4.8kbps|7.2kbps|9.6kbps|14.4kbps
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RFCH:RATE?
```

This command sets the data rate value for the reverse fundamental traffic channel.

***RST** +9.60000000E+003

Field Entry `Bit Rate`

:REVerse:RC34:TRAFfic:RFCH:WALSh

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RFCH:WALSh?
```

This command queries the Walsh code for the reverse fundamental traffic channel.

***RST** +4

Field Entry `Walsh`

:REVerse:RC34:TRAFfic:RFCH[:STATe]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RFCH[:STATe] ON|OFF|
1|0
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RFCH[:STATe]?
```

This command sets the operating state for the reverse fundamental traffic channel.

***RST** 0

Field Entry `State`

:REVerse:RC34:TRAFfic:RSCH[1]|2:DATA

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH[1]|2:DATA PN9|
PN15|FIX4|"<file name>"
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH[1]|2:DATA?
```

This command configures the data field for the reverse supplemental channels.

***RST** PN9

Key Entry **PN9** **PN15** **FIX4** **User File**

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:REVerse:RC34:TRAFfic:RSCH[1]|2:DATA:FIX4

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH[1]|2:DATA:
FIX4 <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH[1]|2:DATA:FIX4?
```

This command sets a fixed 4-bit data pattern that repeats as necessary to fill the selected data area.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

:REVerse:RC34:TRAFfic:RSCH[1]|2:DATA:EBNO

Supported E4438C with Options 401 and 403

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH[1]|2:EBNO <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH[1]|2:EBNO?
```

This command sets the ratio of energy per bit to noise power spectral density (expressed in dB) for the reverse supplemental traffic channels.

***RST** +0.00000000E+000

Range

$$min\ EbNo: 10\log_{10}\left[\frac{\text{Chip Rate}}{1000(\text{Bit Rate})}\right] + \text{Normalized Power}$$

$$max\ EbNo: 10\log_{10}\left[\frac{1000(\text{Chip Rate})}{\text{Bit Rate}}\right] + \text{Normalized Power}$$

Normalized Power is the channel amplitude after adjusting the code power to 0 dB. Refer to ":REVerse:PADJust" on page 523 for adjusting the code domain power.

Field Entry EbNo

Remarks Changes to the EbNo values also change the EcNo values for all other channels in the current link (forward or reverse).

Queries of this command are only valid for the current operating state.

:REVerse:RC34:TRAFfic:RSCH[1]|2:FLENgth

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH[1]|2:
FLENgth 20|40|80
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH[1]|2:FLENgth?
```

This command sets the frame length value for the reverse supplemental channels.

***RST** +20

Field Entry Frame Length

:REVerse:RC34:TRAFfic:RSCH[1]|2:FOFFset

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH[1]|2:
FOFFset <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH[1]|2:FOFFset?
```

This command sets the frame offset value for the reverse supplemental channels.

***RST** +0

Range 0–63

Range Frame Length=20: 0–15 Frame Length=40: 0–31

Frame Length=80: 0–63

Field Entry Frame Offset

:REVerse:RC34:TRAFfic:RSCH[1]|2:POWer

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH[1]|2:
POWer <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH[1]|2:POWer?
```

This command sets the power level for the reverse supplemental channels.

The variable <val> is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –40 to 0

Field Entry `Power`

:REVerse:RC34:TRAFfic:RSCH[1]|2:RCONfig

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH[1]|2:RCONfig 3|
4
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH[1]|2:RCONfig?
```

This command selects the radio configuration value for the reverse supplemental channels.

***RST** +3

Field Entry `Radio Config`

:REVerse:RC34:TRAFfic:RSCH[1]|2:RATE

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH[1]|2:
RATE 1.2ksbps|1.350kbps|1.5kbps|1.8kbps|2.4kbps|2.7kbps|3.6kbps|4.8kbps|
7.2kbps|9.6kbps|14.4kbps
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH[1]|2:RATE?
```

Execute this command to set the data rate for the reverse supplemental channels.

***RST** +9.60000000E+003

Field Entry `Bit Rate`

Remarks To change the frame length value, refer to ":REVerse:RC34:TRAFfic:RSCH[1]|2:FLENgth" on page 549

:REVerse:RC34:TRAFfic:RSCH[1]|2:TCODe

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH[1]|2:TCODe ON|
OFF|1|0
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH[1]|2:TCODe?
```

This command enables or disables the operating state of the turbo coding function for the reverse supplemental channels.

***RST** 0

Field Entry `Turbo Coding`

Remarks To ensure that this function is being executed with the correct data rate, refer to ":REVerse:RC34:TRAFfic:RSCH[1]|2:RATE" on page 550.

:REVerse:RC34:TRAFfic:RSCH[1]|2:WALSh

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH1:WALSh <1|2>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH2:WALSh <2|6>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH[1]|2:WALSh?
```

This command sets the Walsh code value for the reverse supplemental channels.

***RST** Channel 1: +1 Channel 2: +2

Field Entry `Walsh`

:REVerse:RC34:TRAFfic:RSCH[1]|2[:STATe]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH[1]|
2[:STATe] ON|OFF|1|0
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:RC34:TRAFfic:RSCH[1]|2[:STATe]?
```

This command enables or disables the operating state of the reverse supplemental channels.

***RST** 0

Field Entry `State`

:REVerse:REFerence:EXTernal:FREQuency

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:REFerence:EXTernal:
FREQuency <val><unit>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:REFerence:EXTernal:FREQuency?
```

This command sets the expected frequency of the external reference signal.

***RST**	+1.96608000E+007
Range	1–100 MHz
Field Entry	`Ext BBG Ref Freq`
Remarks	This setting must match the frequency of the signal that is supplied to the BASEBAND GEN REF IN rear panel BNC connector.

:REVerse:REFerence[:SOURce]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:REFerence[:SOURce] INTernal|
EXTernal
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:REFerence[:SOURce]?
```

This command selects the reference clock source.

EXTernal	This choice sets the instrument to use an external reference signal. The external reference frequency must be entered and the signal must be applied to the BASEBAND GEN REF IN rear panel connector.
INTernal	This choice sets the instrument to use the internal reference.
***RST**	INT
Field Entry	`BBG Reference`
Remarks	If the EXT choice is selected, the BBCLock selection will automatically be set to internal.

:REVerse:TADVance

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:TADVance <val>
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:TADVance?
```

This command selects the number of chips to advance the trigger time slot for the reverse link.

***RST**	+28
Range	0–2457599
Field Entry	Trigger Advance
Remarks	When the noise function is set to ON, this value will increase. Refer to ":REVerse:NOISe[:STATe]" on page 524 for more information.

:REVerse:TEDGe

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:TEDGe RISing|FALLing
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:TEDGe?
```

This command selects a falling or rising trigger edge state for the reverse link.

RISing	This choice selects a trigger on the rising edge of the signal applied to the PATT TRIG IN rear panel connector.
FALLing	This choice selects a trigger on the falling edge of the signal applied to the PATT TRIG IN rear panel connector.
***RST**	FALL
Key Entry	**Rising** **Falling**

:REVerse:SRATe

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG]:REVerse:SRATe?
```

This command returns the value of the current spreading rate for the reverse channel.

***RST** +1

[:STATe]

Supported E4438C with Option 401

```
[:SOURce]:RADio:CDMA2000[:BBG][:STATe] ON|OFF|1|0
[:SOURce]:RADio:CDMA2000[:BBG][:STATe]?
```

This command enables or disables the CDMA2000 baseband generator modulation format.

***RST**	0
Key Entry	CDMA2000 Off On

Custom Subsystem–Option 001/601or 002/602 ([:SOURce]:RADio:CUSTom)

:ALPha

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:ALPHa <val>
[:SOURce]:RADio:CUSTom:ALPHa?
```

This command changes the Nyquist or root Nyquist filter's alpha value.

The filter alpha value can be set to a minimum level (0), a maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +3.50000000E–001

Range 0.000–1.000

Key Entry **Filter Alpha**

Remarks To change the current filter type, refer to ":FILTer" on page 567.

:ASK

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio[1]|2|3|4:CUSTom:ASK[:DEPTh] <val>
[:SOURce]:RADio[1]|2|3|4:CUSTom:ASK[:DEPTh]?
```

This command changes the depth for the amplitude shift keying (ASK) modulation. Depth is set as a percentage of the full power on level.

***RST** +???

Range 0–100

Key Entry **ASK**

Remarks The modulation is applied to the I signal, the Q value is always kept at zero.

:BBCLock

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:BBCLock INT[1]|EXT[1]
[:SOURce]:RADio:CUSTom:BBCLock?
```

This command toggles the data (bit) clock input to the baseband generator board to either internal or external. This command is independent in each mode and works for both non-burst (continuous) and burst modes. This allows for a matrix of selections between burst/non-burst, internal/external data generation, internal/external data clock, and external bit/symbol data clock.

INT[1] This choice selects the signal generator internal data clock.

EXT[1] This choice selects an external data clock input.

***RST** INT

Key Entry **BBG Data Clock Ext Int**

Remarks A data clock or continuous symbol sync input must be supplied when external mode is used.

This will be ignored if the external reference is set to EXTernal. To change the external reference type, refer to ":EREFerence" on page 566.

:BBT

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:BBT <val>
[:SOURce]:RADio:CUSTom:BBT?
```

This command changes the bandwidth-multiplied-by-bit-time (BbT) filter parameter.

The filter BbT value can be set to the maximum level (1) or in between the minimum level (0.100) and maximum level by using fractional numeric values (0.101–0.999).

***RST** +5.00000000E–001

Range 0.100–1.000

Key Entry **Filter BbT**

Remarks This command is effective only after choosing a Gaussian filter. It does not have an effect on other types of filters.

To change the current filter type, refer to ":FILTer" on page 567.

:BRATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:CUSTom:BRATe <val>
[:SOURce]:RADio:CUSTom:BRATe?
```

This command sets the bit rate in bits per second (bps–Mbps). The maximum bit rate is dependent on the modulation type and filter as shown in the following tables.

The IQ digital data stream is shaped by a FIR filter. The filter length and associated latency and frequency response are dependent on the bit rate as shown in the following tables. The signal generator selects the filter length.

For higher bit rates, the signal generator may truncate the FIR filter length (if the minimum filter size allows it). This will impact the relative timing of the modulated data, as well as the actual filter response (see the symbol rate command “:SRATe” on page 571). Refer to “:FILTer” on page 567 for information on filter symbol widths.

To change the modulation type, refer to “:MODulation[:TYPE]” on page 570.

When the bit rate is changed, the ESG reconfigures the baseband generator. The time required to reconfigure the baseband generator is inversely proportional to the bit rate: lower bit rates require more time.

***RST** +4.68000000E+004

Range

Modulation Type	Bit Rate Range for PRAM or External Serial Data		
	16 Symbol Wide Filter	*32 Symbol Wide Filter*	*64 Symbol Wide Filter*
BPSK, FSK2, MSK	1bps–50Mbps	1bps–25Mbps	1bps–12.5Mbps
C4FM, OQPSK, FSK4	2bps–50Mbps	2bps–25Mbps	2bps–12.5Mbps
OQPSKI95, QPSK			
P4QPPSK, QPSKIS95			
GRAYQPSK, QAM4			
D8PSK, EDGE, FSK8, PSK8	3bps–50Mbps	3bps–25Mbps	3bps–12.5Mbps

FSK16, PSK16, QAM16	4bps–50Mbps	4bps–25Mbps	4bps–12.5Mbps
QAM32	5bps–50Mbps	5bps–25Mbps	5bps–12.5Mbps
QAM64	6bps–50Mbps	6bps–25Mbps	6bps–12.5Mbps
QAM128	7bps–50Mbps	7bps–25Mbps	7bps–12.5Mbps
QAM256	8bps–50Mbps	8bps–25Mbps	8bps–12.5Mbps

NOTE Using I/Q skew will half the minimum number of symbols for the selected filter.

The previous table lists the range for PRAM or external serial data in the Custom format.

The Custom format has two modes for processing data, serial and parallel. When the data-rate exceeds 50 Mbps, the signal generator processes the data in parallel mode (symbol by symbol) versus serial mode where the data is processed bit by bit. This capability exits when using a continuous data stream, which means it does not apply to a PRAM file. The following table shows the various data rates by modulation type and filter width.

Range

Modulation Type	Bit Rate Range for Internal Data		
	16 Symbol Wide Filter	*32 Symbol Wide Filter*	*64 Symbol Wide Filter*
BPSK, FSK2, MSK	1bps–50Mbps	1bps–25 Mbps	1bps–12.5Mbps
C4FM, OQPSK, FSK4	2bps–100Mbps	2bps–50Mbps	2bps–25Mbps
OQPSKI95, QPSK			
P4QPPSK, QPSKIS95			
GRAYQPSK, QAM4			
D8PSK, EDGE, FSK8, PSK8	3bps–150Mbps	3bps–75Mbps	3bps–37.5Mbps
FSK16, PSK16, QAM16	4bps–200Mbps	4bps–100Mbps	4bps–50Mbps
QAM32	5bps–250Mbps	5bps–125Mbps	5bps–62.5Mbps
QAM64	6bps–300Mbps	6bps–150Mbps	6bps–75Mbps
QAM128	7bps–350Mbps	7bps–175Mbps	7bps–87.5Mbps
QAM256	8bps–400Mbps	8bps–200Mbps	8bps–100Mbps

NOTE	Using I/Q skew will half the minimum number of symbols for the selected filter.

Key Entry **Symbol Rate**

:BURSt:SHAPe:FALL:DELay

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:BURSt:SHAPe:FALL:DELay <val>
[:SOURce]:RADio:CUSTom:BURSt:SHAPe:FALL:DELay?
```

This command sets the burst shape fall delay.

The variable `<val>` is expressed in bits.

***RST** +0.00000000E+000

Range –22.3750 to 99

Key Entry **Fall Delay**

Remarks To change the modulation type, refer to ":MODulation[:TYPE]" on page 570. Refer to ":SRATe" on page 571 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:FDELay" on page 559 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:FALL:TIME

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:BURSt:SHAPe:FALL:TIME <val>
[:SOURce]:RADio:CUSTom:BURSt:SHAPe:FALL:TIME?
```

This command sets the burst shape fall time.

The variable <val> is expressed in bits.

***RST** +1.00000000E+001

Range 0.1250–255.8750

Key Entry **Fall Time**

Remarks To change the modulation type, refer to ":MODulation[:TYPE]" on page 570. Refer to ":SRATe" on page 571 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:FTIMe" on page 559 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:FDELay

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:BURSt:SHAPe:FDELay <val>
[:SOURce]:RADio:CUSTom:BURSt:SHAPe:FDELay?
```

This command sets the burst shape fall delay.

The variable <val> is expressed in bits.

***RST** +0.00000000E+000

Range –22.3750 to 99

Key Entry **Fall Delay**

Remarks To change the modulation type, refer to ":MODulation[:TYPE]" on page 570. Refer to ":SRATe" on page 571 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:FALL:DELay" on page 558 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:FTIMe

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:BURSt:SHAPe:FTIMe <val>
[:SOURce]:RADio:CUSTom:BURSt:SHAPe:FTIMe?
```

This command sets the burst shape fall time.

The variable <val> is expressed in bits.

***RST** +0.00000000E+000

Range 0.1250–255.8750

Key Entry **Fall Time**

Remarks To change the modulation type, refer to “:MODulation[:TYPE]” on page 570. Refer to “:SRATe” on page 571 for a list of the minimum and maximum symbol rate values.

“:BURSt:SHAPe:FALL:TIME” on page 558 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User’s Guide*.

:BURSt:SHAPe:RDELay

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:BURSt:SHAPe:RDELay <val>
[:SOURce]:RADio:CUSTom:BURSt:SHAPe:RDELay?
```

This command sets the burst shape rise delay.

The variable <val> is expressed in bits.

***RST** +0.00000000E+000

Range –17.3750 to 99

Key Entry **Rise Delay**

Remarks To change the modulation type, refer to “:MODulation[:TYPE]” on page 570. Refer to “:SRATe” on page 571 for a list of the minimum and maximum symbol rate values.

“:BURSt:SHAPe:RISE:DELay” on page 560 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User’s Guide*.

:BURSt:SHAPe:RISE:DELay

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:BURSt:SHAPe:RISE:DELay <val>
[:SOURce]:RADio:CUSTom:BURSt:SHAPe:RISE:DELay?
```

This command sets the burst shape rise delay.

The variable <val> is expressed in bits.

***RST** +0.00000000E+000

Range –17.3750 to 99

Key Entry **Rise Delay**

Remarks To change the modulation type, refer to “:MODulation[:TYPE]” on page 570. Refer to “:SRATe” on page 571 for a list of the minimum and maximum symbol rate values.

“:BURSt:SHAPe:RDELay” on page 560 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User’s Guide*.

:BURSt:SHAPe:RISE:TIME

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:BURSt:SHAPe:RISE:TIME <val>
[:SOURce]:RADio:CUSTom:BURSt:SHAPe:RISE:TIME?
```

This command sets the burst shape rise time.

The variable <val> is expressed in bits.

***RST** +1.00000000E+001

Range 0.1250–121.5000

Key Entry **Rise Time**

Remarks To change the modulation type, refer to “:MODulation[:TYPE]” on page 570. Refer to “:SRATe” on page 571 for a list of the minimum and maximum symbol rate values.

“:BURSt:SHAPe:RTIMe” on page 562 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User’s Guide*.

:BURSt:SHAPe:RTIMe

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:BURSt:SHAPe:RTIMe <val>
[:SOURce]:RADio:CUSTom:BURSt:SHAPe:RTIMe?
```

This command sets the burst shape rise time.

The variable <val> is expressed in bits.

***RST** +1.00000000E+001

Range 0.1250–121.5000

Key Entry **Rise Time**

Remarks To change the modulation type, refer to “:MODulation[:TYPE]” on page 570. Refer to “:SRATe” on page 571 for a list of the minimum and maximum symbol rate values.

“:BURSt:SHAPe:RISE:TIME” on page 561 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User’s Guide*.

:BURSt:SHAPe[:TYPE]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:BURSt:SHAPe[:TYPE] SINE|"<file name>"
[:SOURce]:RADio:CUSTom:BURSt:SHAPe[:TYPE]?
```

This command specifies the burst shape ("<file name>").

SINE This choice selects a state that is defined by the burst rise and fall *RST values, as the default burst shape type.

"<file name>" This choice selects a user designated file from signal generator memory (non-volatile).

***RST** SINE

Key Entry **Sine** **User File**

:CHANnel

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:CHANnel EVM|ACP
[:SOURce]:RADio:CUSTom:CHANnel?
```

This command optimizes the Nyquist and root Nyquist filters to minimize error vector magnitude (EVM) or to minimize adjacent channel power (ACP).

EVM	This choice provides the most ideal passband.
ACP	This choice improves stopband rejection.
***RST**	ACP
Key Entry	**Optimize FIR For EVM ACP**
Remarks	To change the current filter type, refer to ":FILTer" on page 567.

:DATA

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:DATA PN9|PN11|PN15|PN20|PN23|FIX4|"<file name>"|
EXT|P4|P8|P16|P32|P64|PRAM
[:SOURce]:RADio:CUSTom:DATA?
```

This command sets the data pattern for unframed transmission.

***RST**	PN23
Key Entry	**PN9 PN11 PN15 PN20 PN23 FIX4 User File Ext** **4 1's & 4 0's 8 1's & 8 0's 16 1's & 16 0's 32 1's & 32 0's** **64 1's & 64 0's PRAM File**
Remarks	Refer to "File Name Variables" on page 13 for information on the file name syntax.

:DATA:FIX4

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:DATA:FIX4 <val>
[:SOURce]:RADio:CUSTom:DATA:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern for unframed transmission according to the modulation type, symbol rate, filter, and burst shape selected for the custom modulation format.

***RST**	#B0000
Range	#B0000–#B1111 or 0–15
Key Entry	**FIX4**
Remarks	FIX4 must be already be defined as the data type.

:DATA:PRAM

Supported E4438C with Option 001/601or 002/602001/601or 002/602

```
[:SOURce]:RADio:CUSTom:DATA:PRAM "<file_name>"
[:SOURce]:RADio:CUSTom:DATA:PRAM?
```

This command selects a pattern RAM (PRAM) file as the pattern data type for a custom communications format.

`"<file_name>"`	This variable designates the PRAM file in WFM1. Refer to "File Name Variables" on page 13 for information on the file name syntax.
Key Entry	**PRAM File**
Remarks	Selecting this data source forces the burst source to `INTernal` to allow framing control.
	The PRAM file must reside in the signal generator's volatile memory (WFM1) in order to be accessed by this command. For more information on PRAM files, refer to ":DATA:PRAM:FILE:BLOCk" on page 112.

:DENCode

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:DENCode ON|OFF|1|0
[:SOURce]:RADio:CUSTom:DENCode?
```

This command enables or disables the differential data encoding function.

***RST** 0

Key Entry **Diff Data Encode Off On**

Remarks Executing this command encodes the data bits prior to modulation; each modulated bit is 1 if the data bit is different from the previous one, or 0 if the data bit is the same as the previous one.

:EDATa:DELay

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:EDATa:DELay?
```

This query returns the amount of delay (in symbols) from the external data input to the beginning of the symbol on the I OUT and Q OUT rear panel connectors and the front panel RF OUTPUT connector.

Remarks When the format is turned off, the delay value is unchanged; the query will return the same delay value if the format is on or off.

:EDCLock

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:EDCLock SYMBol|NORMal
[:SOURce]:RADio:CUSTom:EDCLock?
```

This command sets the external data clock use.

SYMBol This choice specifies that a continuous symbol clock signal must be provided to the SYMBOL SYNC input connector.

NORMal This choice specifies that the DATA CLOCK input connector requires a bit clock. The SYMBOL SYNC input connector requires a (one-shot or continuous) symbol sync signal.

***RST** NORM

Key Entry **Ext Data Clock Normal Symbol**

Remarks Both choices have no effect in internal clock mode. Refer to ":BBCLock" on page 555 to select EXT as the data clock type.

:EREFerence

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:EREFerence INTernal|EXTernal
[:SOURce]:RADio:CUSTom:EREFerence?
```

This command selects either an internal or external bit-clock reference for the data generator.

***RST** INT

Key Entry **BBG Ref Ext Int**

Remarks If the EXTernal choice is selected, the external frequency value must be applied to the BASEBAND GEN REF IN rear panel connector.

Refer to ":EREFerence:VALue" on page 566 to enter the external reference frequency.

:EREFerence:VALue

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:EREFerence:VALue <val>
[:SOURce]:RADio:CUSTom:EREFerence:VALue?
```

This command conveys the expected reference frequency value of an externally applied reference to the signal generator.

The variable <val> is expressed in units of Hertz (Hz–MHz).

***RST** +1.30000000E+007

Range 2.5E5–1E8

Key Entry **Ext BBG Ref Freq**

Remarks The value specified by this command is effective only when you are using an external ARB reference applied to the BASEBAND GEN REF IN rear panel connector.

Refer to ":EREFerence" on page 566 to select EXTernal as the reference for the bit clock reference of the data generator.

:FILTer

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:FILTer RNYQuist|NYQuist|GAUSsian|RECTangle|IS95|
IS95_EQ|IS95_MOD|IS95_MOD_EQ|AC4Fm|UGGaussian|"<user FIR>"
[:SOURce]:RADio:CUSTom:FILTer?
```

This command selects the pre-modulation filter type.

IS95	This choice selects a filter that meets the criteria of the IS-95 standard.
IS95_EQ	This choice selects a filter which is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard. This filter is only used for IS-95 baseband filtering.
IS95_MOD	This choice selects a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.
IS95_MOD_EQ	This choice selects a filter which is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance), with lower passband rejection.
AC4Fm	This choice selects a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.
UGGaussian	This choice selects a backwards compatible GSM Gaussian filter (Gaussian filter with a fixed BbT value of 0.300) for the ESG E44xxB Option UN3 or UN4.
"<user FIR>"	This variable is any filter file that you have stored into memory. Refer to “File Name Variables” on page 13 for information on the file name syntax.

The following table shows the filter type and minimum number of symbols. Refer to “:SRATe” on page 571 for information on symbol rate. User-defined filters are not truncated. Internal filters are typically run with 16 or 32 symbols unless the minimum size is larger.

Filter	Minimum Number of Symbols
Gaussian, Nyquist, Root Nyquist, Rectangle	0
Edge	5
UN3/4 GSM Gaussian	8
IS-95, IS-95 w/EQ	16
IS-95 Mod, IS-95 Mod w/EQ	24
IS-2000	27
APCO 25 C4FM	32

***RST** RNYQ

Key Entry **Root Nyquist** **Nyquist** **Gaussian** **Rectangle** **IS-95** **IS-95 w/EQ** **IS-95 Mod** **IS-95 Mod w/EQ** **APCO 25 C4FM** **UN3/4 GSM Gaussian** **User FIR**

:IQ:SCALe

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:IQ:SCALe <val>
[:SOURce]:RADio:CUSTom:IQ:SCALe?
```

This command sets the amplitude of the I/Q outputs for better adjacent channel power (ACP); lower scaling values equate to better ACP.

The variable <val> is expressed in units of percent.

***RST** +70

Range 1–200

Key Entry **I/Q Scaling**

Remarks This command has no effect with MSK or FSK modulation.

:MODulation:FSK[:DEViation]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:MODulation:FSK[:DEViation] <val>
[:SOURce]:RADio:CUSTom:MODulation:FSK[:DEViation]?
```

This command sets the symmetric FSK frequency deviation value.

The variable <val> is expressed in units of Hertz and the maximum range value equals the current symbol rate value multiplied by four, limited to 20 MHz.

***RST** +4.00000000E+002

Range 0–2E7

Key Entry **Freq Dev**

Remarks To change the modulation type, refer to “:MODulation[:TYPE]” on page 570.

Refer to “:SRATe” on page 571 for a list of the minimum and maximum symbol rate values.

To set an asymmetric FSK deviation value, refer to the *E4428C/38C ESG Signal Generators User’s Guide* for more information.

:MODulation:MSK[:PHASe]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:MODulation:MSK[:PHASe] <val>
[:SOURce]:RADio:CUSTom:MODulation:MSK[:PHASe]?
```

This command sets the MSK phase deviation value.

The variable <val> is expressed in units of degrees.

***RST** +9.00000000E+001

Range 0–100

Key Entry **Phase Dev**

:MODulation:UFSK

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:MODulation:UFSK "<file name>"
[:SOURce]:RADio:CUSTom:MODulation:UFSK?
```

This command selects a user-defined FSK file from the signal generator memory.

Key Entry **User FSK**

Remarks The user-defined FSK file is held in signal generator memory until the command that selects user FSK as the modulation type is sent. Refer to ":MODulation[:TYPE]" on page 570 to change the current modulation type.

Refer to "File Name Variables" on page 13 for information on the file name syntax.

:MODulation:UIQ

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:MODulation:UIQ "<file name>"
[:SOURce]:RADio:CUSTom:MODulation:UIQ?
```

This command selects a user-defined I/Q file from the signal generator memory.

Key Entry **User I/Q**

Remarks The user-defined I/Q file is held in signal generator memory until the command that selects user I/Q as the modulation type is sent. Refer to ":MODulation[:TYPE]" on page 570 to change the current modulation type.

Refer to "File Name Variables" on page 13 for information on the file name syntax.

:MODulation[:TYPE]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:MODulation[:TYPE] ASK|BPSK|QPSK|UQPSk|IS95QPSK|GR
AYQPSK|OQPSK|IS95OQPSK|P4DQPSK|PSK8|PSK16|D8PSK|HDQPSK|MSK|FSK2|FSK4|FSK
8|FSK16|C4FM|HCPM|QAM4|QAM16|QAM32|QAM64|QAM128|QAM256|16APSKCR23|16APSK
CR34|16APSKCR45|16APSKCR56|16APSKCR89|16APSKCR910|32APSKCR34|32APSKCR45|
32APSKCR56|32APSKCR89|32APSKCR910|UIQ|UFSK
```

```
[:SOURce]:RADio[1]|2|3|4:CUSTom:MODulation[:TYPE]?
```

This command sets the modulation type for the Custom personality.

***RST** P4DQPSK

Key Entry **ASK** **BPSK** **QPSK** **UQPSk** **IS95QPSK** **GRAYQPSK** **OQPSK** **IS95OQPSK** **P4DQPSK** **PSK8** **PSK16** **D8PSK** **HDQPSK** **MSK** **FSK2** **FSK4** **FSK8** **FSK16** **C4FM** **HCPM** **QAM4** **QAM16** **QAM32** **QAM64** **QAM128** **QAM256** **16APSKCR23** **16APSKCR34** **16APSKCR45** **16APSKCR56** **16APSKCR89** **16APSKCR910** **32APSKCR34** **32APSKCR45** **32APSKCR56** **32APSKCR89** **32APSKCR910** **UIQ** **UFSK**

:POLarity[:ALL]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:POLarity[:ALL] NORMal|INVerted
[:SOURce]:RADio:CUSTom:POLarity[:ALL]?
```

This command sets the rotation direction of the phase modulation vector.

NORMal This choice selects normal phase polarity.

INVerted This choice inverts the internal Q signal.

***RST** NORM

Key Entry **Phase Polarity Normal Invert**

:SRATe

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:SRATe <val>
[:SOURce]:RADio:CUSTom:SRATe?
```

This command sets the transmission symbol rate. Symbol rate is the bit rate divided by the bits per symbol. A change in the symbol rate affects the bit rate. Refer to ":BRATe" on page 556 for information on bit rate.

The variable `<val>` is expressed in units of symbols per second (sps–Msps) and the maximum symbol rate depends on the filter. Refer to ":FILTer" on page 567 for minimum filter symbol widths.

The filter may have to be truncated down to 32 or 16 symbols wide to acheive the highest symbol rate. The signal generator's internal filters are not truncated below their minimum filter length and user-defined FIR filters are not truncated. If the filter cannot be truncated then the symbol rate is limited to the maximum rate of the narrowest filter size possible.

The relative timing of the modulated data, as well as the actual filter response is affected when the filter is truncated.

When the symbol rate changes, the ESG reconfigures the baseband generator. The time required to reconfigure the baseband generator is inversely proportional to the symbol rate: lower symbol rates require more time.

To change the modulation type, refer to “:MODulation[:TYPE]” on page 570.

***RST** +2.43000000E+004

The following table shows the symbol range for internal Custom data operation.

Range	16 Symbol Wide Filter	32 Symbol Wide Filter	64 Symbol Wide Filter
	1sps–50Msps	1sps–25Msps	1sps–12.5Msps

The limits shown in the following table apply to Custom PRAM and Custom external serial data.

Range	Modulation Type	Symbol Rate For PRAM and External Serial Data		
		16 Symbol Wide Filter	*32 Symbol Wide Filter*	*64 Symbol Wide Filter*
	BPSK, FSK2, MSK	1sps–50Msps	1sps–25Msps	1sps–12.5Msps
	C4FM, OQPSK, FSK4	2sps–25Msps	2sps–12.5Msps	2sps–6.25Msps
	OQPSKI95, QPSK			
	P4QPPSK, QPSKIS95			
	GRAYQPSK, QAM4			
	D8PSK, EDGE, FSK8, PSK8	3sps–16.666666666 Msps	3sps–8.333333333 Msps	3sps–4.166666666Msps
	FSK16, PSK16, QAM16	4sps–12.5Msps	4sps–6.25Msps	4sps–3.125Msps
	QAM32	5sps–10Msps	5sps–5Msps	5sps–2.5Msps
	QAM64	6sps–8.333333333 Msps	6sps–4.166666666 Msps	6sps–2.083333333 Msps
	QAM128	7sps–7.142857142 Msps	7sps–3.571428572 Msps	7sps–1.785714285 Msps
	QAM256	8sps–6.25Msps	8sps–3.125 Msps	8sps–1.5625 Msps

Key Entry **Symbol Rate**

:STANdard:SELect

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:STANdard:SELect NONE|AC4Fm|ACQPsk|AHCPm|AHDQpsk|B
LUEtooth|CDPD|16APSKCR23|16APSKCR34|16APSKCR45|16APSKCR56|16APSKCR89|16A
PSKCR910|32APSKCR34|32APSKCR45|32APSKCR56|32APSKCR89|32APSKCR910
```

```
[:SOURce]:RADio[1]|2|3|4:CUSTom:STANdard:SELect?
```

This command selects a predefined setup for Custom (with the appropriate defaults) and/or clears the selection.

NONE	This choice clears the current predefined Custom format.
AC4Fm	This choice sets up an Association of Public Safety Communications Officials (APCO) compliant, compatible 4-level frequency modulation (C4FM) format.
ACQPsk	This choice sets up an Association of Public Safety Communications Officials (APCO) compliant, compatible quadrature phase shift keying (CQPSK) format.
BLUEtooth	This choice sets up a Bluetooth (2-level frequency shift keying) format.
CDPD	This choice sets up a minimum shift keying Cellular Digital Packet Data (CDPD) format.
***RST**	NONE
Key Entry	**None** **AC4Fm** **ACQPsk** **AHCPm** **AHDQpsk** **BLUEtooth** **CDPD** **16APSKCR23** **16APSKCR34** **16APSKCR45** **16APSKCR56** **16APSKCR89** **16APSKCR910** **32APSKCR34** **32APSKCR45** **32APSKCR56** **32APSKCR89** **32APSKCR910**

:TRIGger:TYPE

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:TRIGger:TYPE CONTinuous|SINGle|GATE
[:SOURce]:RADio:CUSTom:TRIGger:TYPE?
```

This command sets the trigger type.

CONTinuous	The framed data sequence repeats continuously; the sequence restarts every time the previous playback is completed. To customize continuous triggering, refer to “:TRIGger:TYPE:CONTinuous[:TYPE]” on page 574.
SINGle	The framed data sequence plays once for every trigger received.
GATE	An external trigger signal interrupts the playback while the gating signal is in the inactive state. Playback resumes when the external control signal returns to the

active state. The active state can be set to high or low.

***RST** CONT

Key Entry **Continuous** **Single** **Gated**

:TRIGger:TYPE:CONTinuous[:TYPE]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:TRIGger:TYPE:CONTinuous[:TYPE] FREE|TRIGger|RESet
[:SOURce]:RADio:CUSTom:TRIGger:TYPE:CONTinuous[:TYPE]?
```

This commands selects the waveform’s response to a trigger signal while using the continuous trigger mode.

For more information on triggering and to select the continuous trigger mode, see “:TRIGger:TYPE” on page 573.

The following list describes the waveform’s response to each of the command choices:

FREE — Turning the ARB format on immediately triggers the waveform. The waveform repeats until you turn the format off, select another trigger, or choose another waveform file.

TRIGger — The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously until you turn the format off, select another trigger, or choose another waveform file.

RESet — The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously. Subsequent triggers reset the waveform to the beginning. For a waveform sequence, this means to the beginning of the first segment in the sequence.

***RST** FREE

Key Entry **Free Run** **Trigger & Run** **Reset & Run**

:TRIGger:TYPE:GATE:ACTive

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:TRIGger:TYPE:GATE:ACTive LOW|HIGH
[:SOURce]:RADio:CUSTom:TRIGger:TYPE:GATE:ACTive?
```

This command selects the active state (gate polarity) of the gate while using the gating trigger mode.

The LOW and HIGH selections correspond to the low and high states of an external trigger signal. For example, when you select HIGH, the active state occurs during the high of the trigger signal. When the active state occurs, the ESG stops the waveform playback at the last played sample point, then restarts the playback at the next sample point when the inactive state occurs. For more information on triggering and to select gating as the trigger mode, see ":TRIGger:TYPE" on page 573.

The following list describes the ESG’s gating behavior for the polarity selections:

LOW The waveform playback stops when the trigger signal goes low (active state) and restarts when the trigger signal goes high (inactive state).

HIGH The waveform playback stops when the trigger signal goes high (active state) and restarts when the trigger signal goes low (inactive state).

***RST** HIGH

Key Entry **Gate Active Low High**

:TRIGger[:SOURce]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:TRIGger[:SOURce] KEY|EXT|BUS
[:SOURce]:RADio:CUSTom:TRIGger[:SOURce]?
```

This command sets the trigger source.

For more information on triggering, see “:TRIGger:TYPE” on page 573. The following list describes the command choices:

KEY This choice enables manual triggering by pressing the front-panel **Trigger** hardkey.

EXT An externally applied signal triggers the waveform. This is the only choice that works with gating. The following conditions affect an external trigger:

- The input connector selected for the trigger signal. You have a choice between the rear-panel PATTERN TRIG IN connector or the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector. To make the connector selection, see “:TRIGger[:SOURce]:EXTernal[:SOURce]” on page 578.

  For more information on the connectors and on connecting the cables, see the *E4428C/38C ESG Signal Generators User’s Guide*.

- The trigger signal polarity:

  — gating mode, see “:TRIGger:TYPE:GATE:ACTive” on page 574
  — continuous and single modes, see “:TRIGger[:SOURce]:EXTernal:SLOPe” on page 578

- The time delay between when the ESG receives a trigger and when the waveform responds to the trigger. There are two parts to setting the delay:

  — setting the amount of delay, see “:TRIGger[:SOURce]:EXTernal:DELay” on page 577

— turning the delay on, see ":TRIGger[:SOURce]:EXTernal:DELay:STATe" on page 577

BUS	This choice enables triggering over the GPIB or LAN using the `*TRG` or `GET` commands or the AUXILIARY INTERFACE (RS-232) using the `*TRG` command.
***RST**	KEY
Key Entry	**Trigger Key** **Ext** **Bus**

:TRIGger[:SOURce]:EXTernal:DELay

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:TRIGger[:SOURce]:EXTernal:DELay <val>
[:SOURce]:RADio:CUSTom:TRIGger[:SOURce]:EXTernal:DELay?
```

This command sets the number of bits to delay the ESG's response to an external trigger.

The bit delay is a delay between when the ESG receives the trigger and when it responds to the trigger. The delay uses the clocks of the bit-clock to time the delay. After the ESG receives the trigger and the set number of delay bits (clocks) occurs, the ESG transmits the data pattern.

The delay occurs after you enable the state. See ":TRIGger[:SOURce]:EXTernal:DELay:STATe" on page 577. You can set the number of bits either before or after enabling the state.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 576.

***RST**	+0
Range	0–1048575
Key Entry	**Ext Delay Bits**

:TRIGger[:SOURce]:EXTernal:DELay:STATe

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:TRIGger[:SOURce]:EXTernal:DELay:STATe ON|OFF|1|0
[:SOURce]:RADio:CUSTom:TRIGger[:SOURce]:EXTernal:DELay:STATe?
```

This command enables or disables the operating state of the external trigger delay function.

For setting the delay time, see ":TRIGger[:SOURce]:EXTernal:DELay" on page 577, and for more information on configuring an external source, see":TRIGger[:SOURce]" on page 576.

***RST**	0
Key Entry	**Ext Delay Off On**

:TRIGger[:SOURce]:EXTernal:SLOPe

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:TRIGger[:SOURce]:EXTernal:SLOPe POSitive|NEGative
[:SOURce]:RADio:CUSTom:TRIGger[:SOURce]:EXTernal:SLOPe?
```

This command sets the polarity for an external trigger signal while using the continuous, single triggering mode. To set the polarity for gating, see ":TRIGger:TYPE:GATE:ACTive" on page 574.

The POSitive and NEGative selections correspond to the high (positive) and low (negative) states of the external trigger signal. For example, when you select POSitive, the waveform responds (plays) during the high state of the trigger signal. When the ESG receives multiple trigger occurrences when only one is required, the signal generator uses the first trigger and ignores the rest.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 576.

***RST** NEG

Key Entry **Ext Polarity Neg Pos**

:TRIGger[:SOURce]:EXTernal[:SOURce]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom:TRIGger[:SOURce]:EXTernal[:SOURce] EPT1|EPT2|
EPTRIGGER1|EPTRIGGER2
[:SOURce]:RADio:CUSTom:TRIGger[:SOURce]:EXTernal[:SOURce]?
```

This command selects which PATTERN TRIG IN connection the ESG uses to accept an externally applied trigger signal when external is the trigger source selection.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 576. For more information on the rear-panel connectors, see the *E4428C/38C ESG Signal Generators User's Guide*.

The following list describes the command choices:

EPT1	This choice is synonymous with EPTRIGGER1 and selects the PATTERN TRIG IN rear-panel connector.
EPT2	This choice is synonymous with EPTRIGGER2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.
EPTRIGGER1	This choice is synonymous with EPT1 and selects the PATTERN TRIG IN rear-panel connector.
EPTRIGGER2	This choice is synonymous with EPT2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.

***RST** EPT1

Key Entry **Patt Trig In 1** **Patt Trig In 2**

[:STATe]

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:CUSTom[:STATe] ON|OFF|1|0
[:SOURce]:RADio:CUSTom[:STATe]?
```

This command enables or disables the Custom modulation.

***RST** 0

Key Entry Custom Off On

Remarks Although the Custom modulation is enabled with this command, the RF carrier is not modulated unless you also activate the front panel **Mod On/Off** hardkey.

DECT Subsystem–Option 402 ([:SOURce]:RADio:DECT)

:ALPha

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:ALPHa <val>
[:SOURce]:RADio:DECT:ALPHa?
```

This command changes the Nyquist or root Nyquist filter's alpha value.

The filter alpha value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +5.00000000E–001

Range 0.000–1.000

Key Entry **Filter Alpha**

Remarks To change the current filter type, refer to ":FILTer" on page 592.

:BBCLock

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:BBCLock INT[1]|EXT[1]
[:SOURce]:RADio:DECT:BBCLock?
```

This command toggles the data (bit) clock input to the baseband generator board to either internal or external. This command is independent in each mode and works for both non-burst (continuous) and burst modes. This allows for a matrix of selections between burst/non-burst, internal/external data generation, internal/external data clock, and external bit/symbol data clock.

INT[1] This choice selects the signal generator internal data clock.

EXT[1] This choice selects an external data clock input.

***RST** INT

Key Entry **BBG Data Clock Ext Int**

Remarks A data clock or continuous symbol sync input must be supplied when external mode is used.

:BBT

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:BBT <val>
[:SOURce]:RADio:DECT:BBT?
```

This command changes the bandwidth-multiplied-by-bit-time (BbT) filter parameter.

The filter BbT value can be set to the maximum level (1) or in between the minimum level (0.100) and maximum level by using fractional numeric values (0.101–0.999).

***RST** +5.00000000E–001

Range 0.100–1.000

Key Entry **Filter BbT**

Remarks This command is effective only after choosing a Gaussian filter. It does not have an effect on other types of filters.

To change the current filter type, refer to “:FILTer” on page 592.

:BRATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:BRATe <val><units>
[:SOURce]:RADio:DECT:BRATe?
```

This command sets the bit rate in bits per second (bps–Mbps). The maximum bit rate is dependent on the modulation type and filter as shown in the following tables

The IQ digital data stream is shaped by a FIR filter. The filter length and associated latency and frequency response are dependent on the bit rate as shown in the following tables. The signal generator selects a filter length.

For higher bit rates, the FIR filter length may be truncated (if the minimum filter size allows it) which will impact the relative timing of the modulated data, as well as the actual filter response (see the symbol rate command “:SRATe” on page 665). Refer to “:FILTer” on page 592 for information on filter symbol widths.

To change the modulation type, refer to “:MODulation[:TYPE]” on page 595.

When the bit rate is changed, the ESG reconfigures the baseband generator. The time required to reconfigure the baseband generator is inversely proportional to the bit rate: lower bit rates require more time.

***RST** +1.15200000E+004

Range

Modulation Type	Bit Rate Range		
	16 Symbol Wide Filter	*32 Symbol Wide Filter*	*64 Symbol Wide Filter*
BPSK, FSK2, MSK	1bps–50Mbps	1bps–25Mbps	1bps–12.5Mbps
C4FM, OQPSK, FSK4 OQPSKI95, QPSK P4QPPSK, QPSKIS95 GRAYQPSK, QAM4	2bps–50Mbps	2bps–25Mbps	2bps–12.5Mbps
D8PSK, EDGE, FSK8, PSK8	3bps–50Mbps	3bps–25Mbps	3bps–12.5Mbps
FSK16, PSK16, QAM16	4bps–50Mbps	4bps–25Mbps	4bps–12.5Mbps
QAM32	5bps–50Mbps	5bps–25Mbps	5bps–12.5Mbps
QAM64	6bps–50Mbps	6bps–25Mbps	6bps–12.5Mbps
QAM128	7bps–50Mbps	7bps–25Mbps	7bps–12.5Mbps
QAM256	8bps–50Mbps	8bps–25Mbps	8bps–12.5Mbps

Key Entry **Symbol Rate**

:BURSt:PN9

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:BURSt:PN9 NORMal|QUICk
[:SOURce]:RADio:DECT:BURSt:PN9?
```

This command controls the software PN9 generation.

NORMal This choice produces a maximum length PN9 sequence.

QUICk This choice produces a truncated PN9 sequence.

***RST** NORM

Key Entry **PN9 Mode Normal Quick**

Remarks Use Normal mode for bit-error-rate tests where a maximum length PN9 sequence is required.

:BURSt:SHAPe:FALL:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:BURSt:SHAPe:FALL:DELay <val>
[:SOURce]:RADio:DECT:BURSt:SHAPe:FALL:DELay?
```

This command sets the burst shape fall delay.

The variable <val> is expressed in bits.

***RST** +0.00000000E+000

Range –10.5625 to 99

Key Entry **Fall Delay**

Remarks To change the modulation type, refer to ":MODulation[:TYPE]" on page 595. Refer to ":SRATe" on page 665 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:FDELay" on page 584 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:FALL:TIME

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:BURSt:SHAPe:FALL:TIME <val>
[:SOURce]:RADio:DECT:BURSt:SHAPe:FALL:TIME?
```

This command sets the burst shape fall time.

The variable <val> is expressed in bits.

***RST** +1.00000000E+001

Range 0.0625–127.9375

Key Entry **Fall Time**

Remarks To change the modulation type, refer to ":MODulation[:TYPE]" on page 595. Refer to ":SRATe" on page 665 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:FTIMe" on page 584 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal*

Generators User's Guide.

:BURSt:SHAPe:FDELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:BURSt:SHAPe:FDELay <val>
[:SOURce]:RADio:DECT:BURSt:SHAPe:FDELay?
```

This command sets the burst shape fall delay.

The variable <val> is expressed in bits.

***RST** +0.00000000E+000

Range –10.5625 to 99

Key Entry **Fall Delay**

Remarks To change the modulation type, refer to ":MODulation[:TYPE]" on page 595. Refer to ":SRATe" on page 665 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:FALL:DELay" on page 583 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:FTIMe

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:BURSt:SHAPe:FTIMe <val>
[:SOURce]:RADio:DECT:BURSt:SHAPe:FTIMe?
```

This command sets the burst shape fall time.

The variable <val> is expressed in bits.

***RST** +1.00000000E+001

Range 0.0625–127.9375

Key Entry **Fall Time**

Remarks To change the modulation type, refer to ":MODulation[:TYPE]" on page 595. Refer to ":SRATe" on page 665 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:FALL:TIME" on page 583 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:RDELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:BURSt:SHAPe:RDELay <val>
[:SOURce]:RADio:DECT:BURSt:SHAPe:RDELay?
```

This command sets the burst shape rise delay.

The variable <val> is expressed in bits.

***RST** +0.00000000E+000

Range –0.5625 to 99

Key Entry **Rise Delay**

Remarks To change the modulation type, refer to ":MODulation[:TYPE]" on page 595. Refer to ":SRATe" on page 665 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:RISE:DELay" on page 585 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:RISE:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:BURSt:SHAPe:RISE:DELay <val>
[:SOURce]:RADio:DECT:BURSt:SHAPe:RISE:DELay?
```

This command sets the burst shape rise delay.

The variable <val> is expressed in bits.

***RST** +0.00000000E+000

Range	–0.5625 to 99
Key Entry	**Rise Delay**
Remarks	To change the modulation type, refer to “:MODulation[:TYPE]” on page 595. Refer to “:SRATe” on page 665 for a list of the minimum and maximum symbol rate values.
	“:BURSt:SHAPe:RDELay” on page 585 performs the same function; in compliance with the SCPI standard, both commands are listed.
	For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User’s Guide*.

:BURSt:SHAPe:RISE:TIME

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:BURSt:SHAPe:RISE:TIME <val>
[:SOURce]:RADio:DECT:BURSt:SHAPe:RISE:TIME?
```

This command sets the burst shape rise time.

The variable <val> is expressed in bits.

***RST**	+1.00000000E+001
Range	0.0625–10.6250
Key Entry	**Rise Time**
Remarks	To change the modulation type, refer to “:MODulation[:TYPE]” on page 595. Refer to “:SRATe” on page 665 for a list of the minimum and maximum symbol rate values.
	“:BURSt:SHAPe:RTIMe” on page 587 performs the same function; in compliance with the SCPI standard, both commands are listed.
	For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User’s Guide*.

:BURSt:SHAPe:RTIMe

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:BURSt:SHAPe:RTIMe <val>
[:SOURce]:RADio:DECT:BURSt:SHAPe:RTIMe?
```

This command sets the burst shape rise time.

The variable <val> is expressed in bits.

***RST** +1.00000000E+001

Range 0.0625–10.6250

Key Entry **Rise Time**

Remarks To change the modulation type, refer to ":MODulation[:TYPE]" on page 595. Refer to ":SRATe" on page 665 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:RISE:TIME" on page 586 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:BURSt:SHAPe[:TYPE] SINE|"<file name>"
[:SOURce]:RADio:DECT:BURSt:SHAPe[:TYPE]?
```

This command specifies the burst shape as either `SINE` or a user-defined file (`"<file name>"`).

SINE This choice selects a state that is defined by the burst rise and fall *RST values, as the default burst shape type.

"<file name>" This choice selects a user-defined file from signal generator memory (non-volatile).

***RST** SINE

Key Entry **Sine** **User File**

:BURSt[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:BURSt[:STATe] ON|OFF|1|0
[:SOURce]:RADio:DECT:BURSt[:STATe]?
```

This command enables or disables the burst function.

ON (1) This choice enables the transmission of framed data. If all timeslots which are switched on are up traffic channels or custom, you will be bursting the timeslots that are on; there will be no RF carrier during the off timeslots.

If you have switched on any timeslot that you have configured as a down traffic channel, the RF carrier is not switched off between any of the timeslots. The off timeslots are transmitted as a continuous series of ones for the time period of the off timeslots.

OFF (0) This choice enables the transmission of unframed data.

***RST** 0

Key Entry **Data Format Pattern Framed**

:CHANnel

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:CHANnel EVM|ACP
[:SOURce]:RADio:DECT:CHANnel?
```

This command optimizes the Nyquist and root Nyquist filters to minimize error vector magnitude (EVM) or to minimize adjacent channel power (ACP).

EVM This choice provides the most ideal passband.

ACP This choice improves stopband rejection.

***RST** EVM

Key Entry **Optimize FIR For EVM ACP**

Remarks To change the current filter type, refer to “:FILTer” on page 592.

:DATA

Supported E4438C with Option 402

`[:SOURce]:RADio:DECT:DATA PN9|PN11|PN15|PN20|PN23|FIX4|"<file name>"|EXT|`
`P4|P8|P16|P32|P64|PRAM`
`[:SOURce]:RADio:DECT:DATA?`

This command sets the data pattern type (pseudo-random number sequence, 4-bit pattern, sequence of 1's and 0's, data from an external source, or a user file) for unframed data transmission.

***RST** PN23

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **Ext**

4 1's & 4 0's **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's**

64 1's & 64 0's **PRAM File**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:DATA:FIX4

Supported E4438C with Option 402

`[:SOURce]:RADio:DECT:DATA:FIX4 <val>`

`[:SOURce]:RADio:DECT:DATA:FIX4?`

This command sets the binary, 4-bit repeating sequence data pattern for unframed transmission according to the modulation type, symbol rate, filter, and burst shape selected for the DECT modulation format.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type. To change the data type, refer to ":DATA" on page 589.

:DATA:PRAM

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:DATA:PRAM "<file_name>"
[:SOURce]:RADio:DECT:DATA:PRAM?
```

This command selects a pattern RAM (PRAM) file as the pattern data type for the DECT (Digital Enhanced Cordless Telecommunications) format.

`"<file_name>"` This variable designates the PRAM file in WFM1. No directory path name is needed. Refer to “File Name Variables” on page 13 for information on the file name syntax.

Key Entry **PRAM File**

Remarks Selecting this data source forces the burst source to `INTernal` to allow framing control.

The PRAM file must reside in the signal generator’s volatile memory (WFM1) in order to be accessed by this command. For more information on PRAM files, refer to “:DATA:PRAM:FILE:BLOCk” on page 112.

:DEFault

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:DEFault
```

This command returns all of the DECT modulation format parameters to factory settings. It does not affect any other signal generator parameters.

Key Entry **Restore Dect Factory Default**

:EDATa:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:EDATa:DELay?
```

This query returns the amount of delay (in symbols) from the external data input to the beginning of the symbol on the I OUT and Q OUT rear panel connectors and the front panel RF OUTPUT connector.

Remarks When the format is turned off, the delay value is unchanged; the query will return the same delay value if the format is on or off.

:EDCLock

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:EDCLock SYMBol|NORMal
[:SOURce]:RADio:DECT:EDCLock?
```

This command sets the external data clock use.

SYMBol This choice specifies that a continuous symbol clock signal must be provided to the SYMBOL SYNC input connector.

NORMal This choice specifies that the DATA CLOCK input connector requires a bit clock. The SYMBOL SYNC input connector requires a (one-shot or continuous) symbol sync signal.

***RST** NORM

Key Entry **Ext Data Clock Normal Symbol**

Remarks Both choices have no effect in internal clock mode. Refer to “:BBCLock” on page 580 to select EXT as the data clock type.

:EREFerence

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:EREFerence INT|EXT
[:SOURce]:RADio:DECT:EREFerence?
```

This command selects either an internal or external bit-clock reference for the data generator.

***RST** INT

Key Entry **BBG Ref Ext Int**

Remarks If the EXT choice is selected, the external source’s frequency value must be applied to the BASEBAND GEN REF IN rear panel connector. The external reference and external data clock are not applicable at the same time. If both are selected, then the external reference takes precedence.

Refer to, “:EREFerence:VALue” on page 592 to enter the external reference frequency setting.

:EREFerence:VALue

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:EREFerence:VALue <val>
[:SOURce]:RADio:DECT:EREFerence:VALue?
```

This command sets the expected bit-clock reference frequency value for an externally applied reference signal.

The variable <val> is expressed in units of hertz (Hz–MHz).

***RST** +1.30000000E+007

Range 2.5E5–1E8

Key Entry **Ext BBG Ref Freq**

Remarks The value specified by this command is effective only when you are using an external reference applied to the BASEBAND GEN REF IN rear panel connector.

Refer to ":EREFerence" on page 591 to select EXT (external source) as the reference for the bit-clock.

:FILTer

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:FILTer RNYQuist|NYQuist|GAUSsian|RECTangle|IS95|
IS95_EQ|IS95_MOD|IS95_MOD_EQ|AC4Fm|UGGaussian|"<user FIR>"
[:SOURce]:RADio:DECT:FILTer?
```

This command specifies the pre-modulation filter type.

IS95 This choice selects a filter that meets the criteria of the IS-95 standard.

IS95_EQ This choice selects a filter which is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard. This filter is only used for IS-95 baseband filtering.

IS95_MOD This choice selects a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.

IS95_MOD_EQ This choice selects a filter which is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance), with lower passband rejection.

AC4Fm This choice selects a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.

UGGaussian	This choice selects a backwards compatible GSM Gaussian filter (Gaussian filter with a fixed BbT value of 0.300) for the ESG E44xxB Option UN3 or UN4.
"<user FIR>"	This variable is any filter file that you have stored into memory.
***RST**	GAUS
Key Entry	**Root Nyquist** **Nyquist** **Gaussian** **Rectangle** **IS-95** **IS-95 w/EQ** **IS-95 Mod** **IS-95 Mod w/EQ** **UN3/4 GSM Gaussian** **APCO 25 C4FM** **User FIR**
Remarks	Refer to "File Name Variables" on page 13 for information on the file name syntax.

:IQ:SCALe

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:IQ:SCALe <val>
[:SOURce]:RADio:DECT:IQ:SCALe?
```

This command sets the amplitude of the I/Q outputs for better adjacent channel power (ACP); lower scaling values equate to better ACP.

The variable <val> is expressed in units of percent.

***RST**	+100
Range	1–200
Key Entry	**I/Q Scaling**
Remarks	This command has no effect with MSK or FSK modulation.

:MODulation:FSK[:DEViation]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:MODulation:FSK[:DEViation] <val>
[:SOURce]:RADio:DECT:MODulation:FSK[:DEViation]?
```

This command sets the symmetric FSK frequency deviation value.

The variable <val> is expressed in units of Hertz and the maximum range value equals the current symbol rate value multiplied by four, limited to 20 MHz.

***RST** +2.88000000E+005

Range 0–2E7

Key Entry **Freq Dev**

Remarks To change the modulation type, refer to ":MODulation[:TYPE]" on page 595.

Refer to ":SRATe" on page 665 for a list of the minimum and maximum symbol rate values.

To set an asymmetric FSK deviation value, refer to the *E4428C/38C ESG Signal Generators User's Guide* for more information.

:MODulation:MSK[:PHASe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:MODulation:MSK[:PHASe] <val>
[:SOURce]:RADio:DECT:MODulation:MSK[:PHASe]?
```

This command sets the MSK phase deviation value.

The variable <val> is expressed in units of degrees.

***RST** +9.00000000E+001

Range 0–100

Key Entry **Phase Dev**

:MODulation:UFSK

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:MODulation:UFSK "<file name>"
[:SOURce]:RADio:DECT:MODulation:UFSK?
```

This command selects a user-defined FSK file from the signal generator memory.

Key Entry **User FSK**

Remarks The user-defined FSK file is held in signal generator memory until the command that selects user FSK as the modulation type is sent. Refer to ":MODulation[:TYPE]" on page 595 to change the current modulation type.

Refer to "File Name Variables" on page 13 for information on the file name syntax.

:MODulation:UIQ

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:MODulation:UIQ "<file name>"
[:SOURce]:RADio:DECT:MODulation:UIQ?
```

This command selects a user-defined I/Q file from the signal generator memory.

Key Entry **User I/Q**

Remarks The user-defined I/Q file is held in signal generator memory until the command that selects user I/Q as the modulation type is sent. Refer to ":MODulation[:TYPE]" on page 595 to change the current modulation type.

Refer to "File Name Variables" on page 13 for information on the file name syntax.

:MODulation[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:MODulation[:TYPE] BPSK|QPSK|IS95QPSK|GRAYQPSK|
OQPSK|IS95OQPSK|P4DQPSK|PSK8|PSK16|D8PSK|MSK|FSK2|FSK4|FSK8|FSK16|C4FM|
QAM4|QAM16|QAM32|QAM64|QAM128|QAM256|UIQ|UFSK
[:SOURce]:RADio:DECT:MODulation[:TYPE]?
```

This command sets the modulation type for the DECT personality.

***RST** FSK2

Key Entry **BPSK** **QPSK** **IS-95 QPSK** **Gray Coded QPSK** **OQPSK**

IS-95 OQPSK **π/4 DQPSK** **8PSK** **16PSK** **D8PSK** **MSK** **2-Lvl FSK**

4-Lvl FSK **8-Lvl FSK** **16-Lvl FSK** **C4FM** **4QAM** **16QAM** **32QAM**

64QAM **128QAM** **256QAM** **User I/Q** **User FSK**

:POLarity[:ALL]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:POLarity[:ALL] NORMal|INVerted
[:SOURce]:RADio:DECT:POLarity[:ALL]?
```

This command sets the rotation direction of the phase modulation vector.

NORMal This choice selects normal phase polarity.

INVerted	This choice inverts the internal Q signal.
***RST**	NORM
Key Entry	**Phase Polarity Normal Invert**

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11[:TYPE]
CUSTom|TRAFfic|LCAPacity|ZTRaffic|ZLCapacity
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11[:TYPE]?
```

This command specifies the timeslot type for the selected timeslot in the portable part link.

***RST**	Timeslot 0: TRAF Timeslots 1–4: CUST
Key Entry	**Custom** **Traffic Bearer** **Low Capacity** **Traffic Bearer with Z field** **Low Capacity with Z field**

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:CUSTom

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:CUSTom PN9|
PN11|PN15|PN20|PN23|FIX4|"<file name>"|EXT|FDEV1_HS|FDEV1_FS|FDEV2_FS|
FACCuracy|DM1|DM0|P4|P8|P16|P32|P64
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:CUSTom?
```

This command customizes the selected custom timeslot for a portable part link.

***RST**	PN9
Key Entry	**PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **Ext** **FDEV1_HS** **FDEV1_FS** **FDEV2_FS** **FACC** **DM1** **DM0** **4 1’s & 4 0’s** **8 1’s & 8 0’s** **16 1’s & 16 0’s** **32 1’s & 32 0’s** **64 1’s & 64 0’s**
Remarks	Refer to “File Name Variables” on page 13 for information on the file name syntax.

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:CUSTom:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:CUSTom:
FIX4 <val>
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:CUSTom:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern which is used in the portable part custom data field of the selected timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type. To change the data type, refer to ":PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:CUSTom" on page 596.

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:A

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:
A <val>
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:A?
```

This command customizes the A field for the selected low-capacity timeslot in the portable part link.

***RST** #H0000FFFF0000FFFF

Range #H0–#HFFFFFFFFFFFFFFFF

Key Entry **A field**

Remarks The A field carries signaling data (48 bits) and error correction (16 bits).

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:P

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:
P <val>
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:P?
```

This command customizes the preamble (P) field of the selected low-capacity timeslot in the portable part link.

***RST** #H5555

Range #H0–#HFFFF

Key Entry **P**

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:S

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:
S <val>
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:S?
```

This command customizes the synchronization pattern of the selected low-capacity timeslot in the portable part link.

***RST** #H1675

Range #H0–#HFFFF

Key Entry **S**

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity[:B]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
LCAPacity[:B] PN9|PN11|PN15|PN20|PN23|FIX4|"<file name>"|EXT|FDEV1_HS|
FDEV1_FS|FDEV2_FS|FACCuracy|DM1|DM0|P4|P8|P16|P32|P64
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
LCAPacity[:B]?
```

This command sets the data pattern type (pseudo-random number sequence, 4-bit pattern, sequence of 1's and 0's, data from an external source, or a user file) for the B field of the selected portable part low-capacity timeslot.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **Ext** **FDEV1_HS** **FDEV1_FS** **FDEV2_FS** **FACC** **DM1** **DM0** **4 1's & 4 0's** **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's** **64 1's & 64 0's**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity[:B]:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
LCAPacity[:B]:FIX4 <val>
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
LCAPacity[:B]:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected portable part low-capacity timeslot B field.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type. Refer to ":PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity[:B]" on page 599 to change the data type.

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:POWer

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:
POWer MAIN|DELTa
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:
POWer?
```

This command defines the RF output power level for the selected timeslot.

MAIN This choice specifies RF output as the main power level.

DELTa This choice specifies RF output as the alternative power level.

***RST** MAIN

Key Entry **Timeslot Ampl Main Delta**

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:STATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:STATe ON|OFF|
1|0
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:STATe?
```

This command enables or disables the operating state of the selected portable part timeslot.

***RST** Timeslot 0: 1 Timeslots 1–11: 0

Key Entry **Timeslot Off On**

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic:A

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic:
A <val>
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic:A?
```

This command customizes the A field for the selected traffic bearer timeslot in the portable part link. The A field carries signaling data (48 bits) and error correction
(16 bits).

***RST** #H0000FFFF0000FFFF

Range #H0–#HFFFFFFFFFFFFFFFF

Key Entry **A field**

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic:P

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic:
P <val>
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic:P?
```

This command customizes the preamble (P) field of the selected traffic bearer timeslot in the portable part link.

***RST** #H5555

Range #H0–#HFFFF

Key Entry **P**

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic:S

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic:
S <val>
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic:
S?
```

This command sets the synchronization pattern for the selected traffic bearer timeslot in the portable part link.

***RST** #H1675

Range #H0–#HFFFF

Key Entry **S**

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic[:B]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
TRAFfic[:B] PN9|PN11|PN15|PN20|PN23|FIX4|"<file name>"|EXT|FDEV1_HS|
FDEV1_FS|FDEV2_FS|FACCuracy|DM1|DM0|P4|P8|P16|P32|P64
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic[:B]?
```

This command sets the B field data pattern for the selected traffic bearer timeslot in the portable part link.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **Ext** **FDEV1_HS**

FDEV1_FS **FDEV2_FS** **FACC** **DM1** **DM0** **4 1's & 4 0's**

8 1's & 8 0's **16 1's & 16 0's** **32 1's & 32 0's** **64 1's & 64 0's**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic[:B]:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic[:B]:
FIX4 <val>
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic[:B]:
FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the portable part traffic bearer B field of the selected timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type.

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity:A

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity:
A <val>
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity:A?
```

This command customizes the A field for the selected low-capacity with Z field timeslot in the portable part link.

The A field carries signaling data (48 bits) and error correction (16 bits).

***RST** #H0000FFFF0000FFFF

Range #H0–#HFFFFFFFFFFFFFFFF

Key Entry **A**

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity:P

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity:
P <val>
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity:P?
```

This command customizes the preamble (P) field of the selected low-capacity with Z field timeslot in the portable part link.

***RST** #H5555

Range #H0–#HFFFF

Key Entry **P**

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity:A

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity:
S <val>
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity:S?
```

This command customizes the synchronization pattern of the selected low-capacity with Z field timeslot in the portable part link.

***RST** #H1675

Range #H0–#HFFFF

Key Entry **S**

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity[:B]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
ZLCapacity[:B] PN9|PN11|PN15|PN20|PN23|FIX4|"<file name>"|EXT|FDEV1_HS|
FDEV1_FS|FDEV2_FS|FACCuracy|DM1|DM0|P4|P8|P16|P32|P64
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
ZLCapacity[:B]?
```

This command sets the data pattern for the B field of the selected portable part low-capacity with Z field timeslot.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **Ext** **FDEV1_HS**

FDEV1_FS **FDEV2_FS** **FACC** **DM1** **DM0** **4 1's & 4 0's**

8 1's & 8 0's **16 1's & 16 0's** **32 1's & 32 0's** **64 1's & 64 0's**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity[:B]:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
ZLCapacity[:B]:FIX4 <val>
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
ZLCapacity[:B]:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the portable part low-capacity with Z field B field of the selected timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type.

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic:A

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic:
A <val>
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic:A?
```

This command customizes the A field for the selected traffic bearer with Z field timeslot in the portable part link. The A field carries signaling data (48 bits) and error correction (16 bits).

***RST** #H0000FFFF0000FFFF

Range #H0–#HFFFFFFFFFFFFFFFF

Key Entry **A field**

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic:P

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic:
P <val>
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic:P?
```

This command customizes the preamble (P) field of the selected traffic bearer with Z field timeslot in the portable part link.

***RST** #H5555

Range #H0–#HFFFF

Key Entry **P**

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic:S

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic:
S <val>
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic:S?
```

This command sets the synchronization pattern for the selected traffic bearer with Z field timeslot in the portable part link.

***RST** #H1675

Range #H0–#HFFFF

Key Entry **S**

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic[:B]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
ZTRaffic[:B] PN9|PN11|PN15|PN20|PN23|FIX4|"<file name>"|EXT|FDEV1_HS|
FDEV1_FS|FDEV2_FS|FACCuracy|DM1|DM0|P4|P8|P16|P32|P64
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic[:B]?
```

This command sets the B field data pattern for the selected traffic bearer with Z field timeslot in the portable part link.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **Ext** **FDEV1_HS**

FDEV1_FS **FDEV2_FS** **FACC** **DM1** **DM0** **4 1's & 4 0's**

8 1's & 8 0's **16 1's & 16 0's** **32 1's & 32 0's** **64 1's & 64 0's**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic[:B]:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic[:B]:
FIX4 <val>
[:SOURce]:RADio:DECT:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic[:B]:
FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the portable part traffic bearer with Z field B field of the selected timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type. Refer to ":PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic[:B]" on page 606 to change the data type.

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11[:TYPE]
CUSTom|DUMM[1]|DUMM2|TRAFfic|LCAPacity|ZTRaffic|ZLCapacity
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11[:TYPE]?
```

This command selects the timeslot type for the selected timeslot in the radio fixed part link.

***RST** Timeslot 0: TRAF Timeslots 1–4: CUST

Key Entry **Custom** **Dummy Bearer 1** **Dummy Bearer 2** **Traffic Bearer**

Low Capacity **Traffic Bearer with Z field** **Low Capacity with Z field**

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:CUSTom

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:CUSTom PN9|
PN11|PN15|PN20|PN23|FIX4|"<file name>"|EXT|FDEV1_HS|FDEV1_FS|FDEV2_FS|
FACCuracy|DM1|DM0|P4|P8|P16|P32|P64
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:CUSTom?
```

This command sets the data pattern for the data field of the selected custom timeslot in the radio fixed part link.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **Ext** **FDEV1_HS**

FDEV1_FS **FDEV2_FS** **FACC** **DM1** **DM0** **4 1’s & 4 0’s**

8 1’s & 8 0’s **16 1’s & 16 0’s** **32 1’s & 32 0’s** **64 1’s & 64 0’s**

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:CUSTom:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:CUSTom:
FIX4 <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:CUSTom:
FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected radio fixed part custom timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type. Refer to ":RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:CUSTom" on page 607 to change the data type.

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:DUMM2:A

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:DUMM2:
A <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:DUMM2:A?
```

This command customizes the A field for the selected dummy 2 timeslot in the radio fixed part link.

***RST** #H0000FFFF0000FFFF

Range #H0–#HFFFFFFFFFFFFFFFF

Key Entry **A field**

Remarks The A field carries signaling data (48 bits) and error correction (16 bits).

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:DUMM2:P

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:DUMM2:
P <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:DUMM2:P?
```

This command customizes the preamble (P) field for the selected dummy 2 timeslot in the radio fixed part link.

***RST** #HAAAA

Range #H0–#HFFFF

Key Entry **P**

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:DUMM2:S

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:DUMM2:
S <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:DUMM2:S?
```

This command customizes the synchronization (S) field of the selected dummy 2 timeslot in the radio fixed part link.

***RST** #HE98A

Range #H0–#HFFFF

Key Entry **S**

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:DUMM[1]:A

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:DUMM[1]:
A <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:DUMM[1]:A?
```

This command customizes the A field for the selected dummy 1 timeslot in the radio fixed part link.

***RST** #H0000FFFF0000FFFF

Range #H0–#HFFFFFFFFFFFFFFFF

Key Entry **A field**

Remarks The 64-bit A field carries signaling data (48 bits) and error correction (16 bits).

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:DUMM[1]:P

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:DUMM[1]:
P <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:DUMM[1]:P?
```

This command customizes the preamble (P) field for the selected dummy 1 timeslot in the radio fixed part link.

***RST** #HAAAA

Range #H0–#HFFFF

Key Entry **P**

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:DUMM[1]:S

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:DUMM[1]:
S <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:DUMM[1]:S?
```

This command customizes the synchronization (S) field of the selected dummy 1 timeslot in the radio fixed part link.

***RST** #HE98A

Range #H0–#HFFFF

Key Entry **S**

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:A

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:
A <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:A?
```

This command customizes the A field for the selected low-capacity timeslot in the radio fixed part link.

***RST** #H0000FFFF0000FFFF

Range #H0–#HFFFFFFFFFFFFFFFF

Key Entry **A field**

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:P

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:
P <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:P?
```

This command customizes the preamble (P) field of the selected low-capacity timeslot in the portable part link.

***RST** #HAAAA

Range #H0–#H1111

Key Entry **P**

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:S

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:
S <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:S?
```

This command customizes the synchronization pattern of the selected low-capacity timeslot in the portable part link.

***RST** #HE98A

Range #H0–#H1111

Key Entry **S**

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity[:B]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
LCAPacity[:B] PN9|PN11|PN15|PN20|PN23|FIX4|"<file name>"|EXT|FDEV1_HS|
FDEV1_FS|FDEV2_FS|FACCuracy|DM1|DM0|P4|P8|P16|P32|P64
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
LCAPacity[:B]?
```

This command sets the data pattern for the B field of the selected portable part low-capacity timeslot.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **Ext** **FDEV1_HS** **FDEV1_FS** **FDEV2_FS** **FACC** **DM1** **DM0** **4 1's & 4 0's** **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's** **64 1's & 64 0's**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity[:B]:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
LCAPacity[:B]:FIX4 <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
LCAPacity[:B]:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected radio fixed part low-capacity timeslot B field.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type.

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:POWer

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:POWer MAIN|
DELTa
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:POWer?
```

This command defines the RF output power level for the selected timeslot.

MAIN This choice specifies RF output as the main power level.

DELTa This choice specifies RF output as the alternative power level.

***RST** MAIN

Key Entry **Timeslot Ampl Main Delta**

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:STATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:STATe ON|
OFF|1|0
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:STATe?
```

This command enables or disables the operating state of the selected timeslot in the radio fixed part.

***RST** Timeslot 0: 1 Timeslots 1–11: 0

Key Entry **Timeslot Off On**

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic:A

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic:
A <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic:A?
```

This command customizes the A field for the selected traffic bearer timeslot in the portable part link.

***RST** #H0000FFFF0000FFFF

Range #H0–#HFFFFFFFFFFFFFFFF

Key Entry **A field**

Remarks The A field carries signaling data (48 bits) and error correction (16 bits).

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic:P

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic:
P <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic:P?
```

This command customizes the preamble (P) field of the selected traffic bearer timeslot in the radio fixed part link.

***RST** #HAAAA

Range #H0–#HFFFF

Key Entry **P**

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic:S

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic:
S <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic:S?
```

This command customizes the synchronization (S) field of the selected traffic bearer timeslot in the radio fixed part link.

***RST** #HE98A

Range #H0–#HFFFF

Key Entry **S**

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic[:B]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
TRAFfic[:B] PN9|PN11|PN15|PN20|PN23|FIX4|"<file name>"|EXT|FDEV1_HS|
FDEV1_FS|FDEV2_FS|FACCuracy|DM1|DM0|P4|P8|P16|P32|P64
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic[:B]?
```

This command sets the B field’s data pattern for the selected traffic bearer timeslot in the radio fixed part during framed data transmission.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **Ext** **FDEV1_HS**

FDEV1_FS **FDEV2_FS** **FACC** **DM1** **DM0** **4 1’s & 4 0’s**

8 1’s & 8 0’s **16 1’s & 16 0’s** **32 1’s & 32 0’s** **64 1’s & 64 0’s**

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic[:B]:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic[:B]
:FIX4 <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic[:B]:
FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected radio fixed part traffic bearer timeslot B field.

***RST**	#B0000
Range	#B0000–#B1111 or 0–15
Key Entry	**FIX4**
Remarks	FIX4 must already be defined as the data type, refer to ":RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic[:B]" on page 614.

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity:A

Supported E4438C with Option 402

```
[:SOURce]:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity:
A <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity:
A?
```

This command customizes the A field for the selected low-capacity with Z field timeslot in the radio fixed part link. The A field carries signaling data (48 bits) and error correction (16 bits).

***RST**	#H0000FFFF0000FFFF
Range	#H0–#HFFFFFFFFFFFFFFFF
Key Entry	**A field**

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity:P

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity:
P <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity:
P?
```

This command customizes the preamble (P) field of the selected low-capacity with Z field timeslot in the radio fixed part link.

***RST** #HAAAA

Range #H0–#HFFFF

Key Entry **P**

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity:S

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity:
S <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity:
S?
```

This command customizes the synchronization (S) field of the selected low-capacity with Z field timeslot in the radio fixed part link.

***RST** #HE98A

Range #H0–#HFFFF

Key Entry **S**

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity[:B]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
ZLCapacity[:B] PN9|PN11|PN15|PN20|PN23|FIX4|"<file name>"|EXT|FDEV1_HS|
FDEV1_FS|FDEV2_FS|FACCuracy|DM1|DM0|P4|P8|P16|P32|P64
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
ZLCapacity[:B]?
```

This command sets the B field’s data pattern for the selected low-capacity with Z field timeslot in the radio fixed part during framed data transmission.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **Ext** **FDEV1_HS**

FDEV1_FS **FDEV2_FS** **FACC** **DM1** **DM0** **4 1’s & 4 0’s**

8 1’s & 8 0’s **16 1’s & 16 0’s** **32 1’s & 32 0’s** **64 1’s & 64 0’s**

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity[:B]:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
ZLCapacity[:B]:FIX4 <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
ZLCapacity[:B]:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected radio fixed part low-capacity with Z field timeslot B field.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type.

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic:A

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic:
A <val>
 [:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic:A?
```

This command customizes the A field for the selected traffic bearer timeslot in the radio fixed part link. The A field carries signaling data (48 bits) and error correction (16 bits).

***RST** #H0000FFFF0000FFFF

Range #H0–#HFFFFFFFFFFFFFFFF

Key Entry **A field**

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic:P

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic:
P <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic:P?
```

This command customizes the preamble (P) field of the selected traffic bearer with Z field timeslot in the radio fixed part link.

***RST** #HAAAA

Range #H0–#HFFFF

Key Entry **P**

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic:S

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic:
S <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic:S?
```

This command customizes the synchronization (S) field of the selected traffic bearer with Z field timeslot in the radio fixed part link.

***RST** #HE98A

Range #H0–#HFFFF

Key Entry **S**

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic[:B]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
ZTRaffic[:B] PN9|PN15|FIX4|"<file name>"|EXT|FDEV1_HS|FDEV1_FS|
FDEV2_FS|FACCuracy|DM1|DM0|P4|P8|P16|P32|P64
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
ZTRaffic[:B]?
```

This command sets the B field data pattern for the selected traffic bearer with Z field timeslot in the portable part link.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **Ext** **FDEV1_HS** **FDEV1_FS** **FDEV2_FS** **FACC** **DM1** **DM0** **4 1's & 4 0's** **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's** **64 1's & 64 0's**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic[:B]:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
ZTRaffic[:B]:FIX4 <val>
[:SOURce]:RADio:DECT:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:
ZTRaffic[:B]:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected radio fixed part traffic bearer with Z field timeslot B field.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type.

:SECondary:RECall

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:SECondary:RECall
```

This command recalls the secondary frame configuration, overwriting the current state.

Key Entry **Recall Secondary Frame State**

Remarks To save a secondary frame state, refer to ":SECondary:SAVE" on page 619.

A secondary frame is not active until the secondary state is enabled. To activate a secondary frame, refer to ":SECondary[:STATe]" on page 620.

:SECondary:SAVE

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:SECondary:SAVE
```

This command saves the current frame configuration as the secondary frame with the filename `DECT_SECONDARY_FRAME`.

Key Entry **Save Secondary Frame State**

Remarks To recall the secondary frame (saved in non-volatile signal generator memory), refer to ":SECondary:RECall" on page 619.

:SECondary:TRIGger[:SOURce]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:SECondary:TRIGger[:SOURce] KEY|EXT|BUS
[:SOURce]:RADio:DECT:SECondary:TRIGger[:SOURce]?
```

This command selects the type of triggering for the secondary frame.

KEY This choice enables triggering by pressing the front panel **Trigger** hardkey.

EXT This choice enables triggering using an externally applied signal at the PATT TRIG IN rear panel connector or the PATT TRIG IN 2 pin on the rear panel AUX I/O connector. To select the appropriate connector, refer to ":TRIGger[:SOURce]:EXTernal[:SOURce]" on page 627.

BUS This choice enables GPIB triggering using the `*TRG` or `GET` command or LAN and RS-232 triggering using the `*TRG` command.

Key Entry **Trigger Key** **Ext** **Bus**

:SECondary[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:SECondary[:STATe] ON|OFF|1|0
[:SOURce]:RADio:DECT:SECondary[:STATe]?
```

This command enables or disables the ability to switch to the secondary frame.

***RST** 0

Key Entry **Secondary Frame Off On**

Remarks A frame must already be saved as the secondary frame in order to turn the secondary state function on.

To save a frame as the secondary frame, refer to ":SECondary:SAVE" on page 619.

:SOUT

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:SOUT FRAME|SLOT|ALL
[:SOURce]:RADio:DECT:SOUT?
```

This command sets the synchronization location (within the pattern of data) and the type of output at the EVENT 1 rear panel connector.

FRAME This choice outputs a 1-bit signal, synchronized to the bit selected by the synchronization output offset command, for a framed data pattern.

SLOT This choice outputs a 1-bit signal, synchronized to the bit selected by the synchronization output offset command, for a selected timeslot.

ALL This choice outputs a 1-bit signal, synchronized to the bit selected by the synchronization output offset command, for all active timeslots.

***RST** FRAME

Key Entry **Begin Frame** **Begin Timeslot #** **All Timeslots**

:SOUT:OFFSet

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:SOUT:OFFSet <val>
[:SOURce]:RADio:DECT:SOUT:OFFSet?
```

This command sets the offset value for the location of the output synchronization signal on the EVENT1 rear panel connector relative to the beginning of the framed data pattern or timeslot.

The variable <val> is expressed in bits.

***RST** +0

Range –479 to 479

Key Entry **Sync Out Offset**

Remarks Negative values move the synchronization output signal earlier; positive values move it later.

To change the output of the EVENT1 rear panel connector to SLOT, refer to “:SOUT” on page 621.

:SOUT:SLOT

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:SOUT:SLOT <val>
[:SOURce]:RADio:DECT:SOUT:SLOT?
```

This command selects the timeslot that will trigger a 1-bit signal at the EVENT 1 rear panel connector.

***RST** +1

Range Radio Fixed Part Link: 0–12 Portable Part Link: 1–11

Key Entry **Begin Timeslot #**

Remarks To change the output of the EVENT1 rear panel connector to SLOT, refer to ":SOUT" on page 621.

:SRATe

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:DECT:SRATe <val>
[:SOURce]:RADio:DECT:SRATe?
```

This command sets the transmission symbol rate. Symbol rate is the bit rate divided by the bits per symbol. A change in the symbol rate affects the bit rate. Refer to ":BRATe" on page 581 for information on bit rate.

The variable `<val>` is expressed in units of symbols per second (sps–Msps) and the maximum symbol rate depends on the filter. Refer to ":FILTer" on page 592 for minimum filter symbol width

The filter may have to be truncated down to 32 or 16 symbols wide to acheive the highest symbol rate. The signal generator's internal filters are not truncated below their minimum filter length and user-defined FIR filters are not truncated. If the filter cannot be truncated then the symbol rate is limited to the maximum rate of the narrowest filter size possible.

The relative timing of the modulated data, as well as the actual filter response is affected when the filter is truncated.

When the symbol rate changes, the ESG reconfigures the baseband generator. The time required to reconfigure the baseband generator is inversely proportional to the symbol rate: lower symbol rates require more time.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 595.

***RST** +1.15200000E+006

Range

Modulation Type	Symbol Rate Range		
	16 Symbol Wide Filter	*32 Symbol Wide Filter*	*64 Symbol Wide Filter*
BPSK, FSK2, MSK	1sps–50Msps	1sps–25Msps	1sps–12.5Msps
C4FM, OQPSK, FSK4	2sps–25Msps	2sps–12.5Msps	2sps–6.25Msps
OQPSKI95, QPSK			
P4QPPSK, QPSKIS95			
GRAYQPSK, QAM4			
D8PSK, EDGE, FSK8, PSK8	3sps–16.666666666 Msps	3sps–8.333333333 Msps	3sps–4.166666666Msps
FSK16, PSK16, QAM16	4sps–12.5Msps	4sps–6.25Msps	4sps–3.125Msps
QAM32	5sps–10Msps	5sps–5Msps	5sps–2.5Msps
QAM64	6sps–8.333333333 Msps	6sps–4.166666666 Msps	6sps–2.083333333 Msps
QAM128	7sps–7.142857142 Msps	7sps–3.571428572 Msps	7sps–1.785714285 Msps
QAM256	8sps–6.25Msps	8sps–3.125 Msps	8sps–1.5625 Msps

NOTE Using I/Q skew will half the minimum number of symbols for the selected filter.

Key Entry **Symbol Rate**

:TRIGger:TYPE

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:TRIGger:TYPE CONTinuous|SINGle|GATE
[:SOURce]:RADio:DECT:TRIGger:TYPE?
```

This command sets the trigger type.

CONTinuous The framed data sequence repeats continuously; the sequence restarts every time the previous playback is completed. To customize continuous triggering, refer to ":TRIGger:TYPE:CONTinuous[:TYPE]" on page 624.

SINGle The framed data sequence plays once for every trigger received.

GATE	An external trigger signal interrupts the playback while the gating signal is in the inactive state. Playback resumes when the external control signal returns to the active state. The active state can be set to high or low.
***RST**	CONT
Key Entry	**Continuous** **Single** **Gated**

:TRIGger:TYPE:CONTinuous[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:TRIGger:TYPE:CONTinuous[:TYPE] FREE|TRIGger|RESet
[:SOURce]:RADio:DECT:TRIGger:TYPE:CONTinuous[:TYPE]?
```

This commands selects the waveform’s response to a trigger signal while using the continuous trigger mode.

For more information on triggering and to select the continuous trigger mode, see “:TRIGger:TYPE” on page 623.

The following list describes the waveform’s response to each of the command choices:

FREE	Turning the ARB format on immediately triggers the waveform. The waveform repeats until you turn the format off, select another trigger, or choose another waveform file.
TRIGger	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously until you turn the format off, select another trigger, or choose another waveform file.
RESet	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously. Subsequent triggers reset the waveform to the beginning. For a waveform sequence, this means to the beginning of the first segment in the sequence.
***RST**	FREE
Key Entry	**Free Run** **Trigger & Run** **Reset & Run**

:TRIGger:TYPE:GATE:ACTive

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:TRIGger:TYPE:GATE:ACTive LOW|HIGH
[:SOURce]:RADio:DECT:TRIGger:TYPE:GATE:ACTive?
```

This command selects the active state (gate polarity) of the gate while using the gating trigger mode.

The LOW and HIGH selections correspond to the low and high states of an external trigger signal. For example, when you select HIGH, the active state occurs during the high of the trigger signal. When the active state occurs, the ESG stops the waveform playback at the last played sample point, then restarts the playback at the next sample point when the inactive state occurs. For more information on triggering and to select gating as the trigger mode, see ":TRIGger:TYPE" on page 623.

The following list describes the ESG's gating behavior for the polarity selections:

LOW The waveform playback stops when the trigger signal goes low (active state) and restarts when the trigger signal goes high (inactive state).

HIGH The waveform playback stops when the trigger signal goes high (active state) and restarts when the trigger signal goes low (inactive state).

***RST** HIGH

Key Entry **Gate Active Low High**

:TRIGger[:SOURce]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:TRIGger[:SOURce] KEY|EXT|BUS
[:SOURce]:RADio:DECT:TRIGger[:SOURce]?
```

This command sets the trigger source.

For more information on triggering, see ":TRIGger:TYPE" on page 623. The following list describes the command choices:

KEY This choice enables manual triggering by pressing the front-panel **Trigger** hardkey.

EXT An externally applied signal triggers the waveform. This is the only choice that works with gating. The following conditions affect an external trigger:

- The input connector selected for the trigger signal. You have a choice between the rear-panel PATTERN TRIG IN connector or the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector. To make the connector selection, see ":TRIGger[:SOURce]:EXTernal[:SOURce]" on page 627.

For more information on the connectors and on connecting the cables, see the *E4428C/38C ESG Signal Generators User's Guide*.

- The trigger signal polarity:
  - gating mode, see ":TRIGger:TYPE:GATE:ACTive" on page 625
  - continuous and single modes, see ":TRIGger[:SOURce]:EXTernal:SLOPe" on page 627
- The time delay between when the ESG receives a trigger and when the waveform responds to the trigger. There are two parts to setting the delay:
  - setting the amount of delay, see ":TRIGger[:SOURce]:EXTernal:DELay" on page 626
  - turning the delay on, see ":TRIGger[:SOURce]:EXTernal:DELay:STATe" on page 628

BUS — This choice enables triggering over the GPIB or LAN using the `*TRG` or `GET` commands or the AUXILIARY INTERFACE (RS-232) using the `*TRG` command.

***RST** KEY

Key Entry **Trigger Key** **Ext** **Bus**

:TRIGger[:SOURce]:EXTernal:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:TRIGger[:SOURce]:EXTernal:DELay <val>
[:SOURce]:RADio:DECT:TRIGger[:SOURce]:EXTernal:DELay?
```

This command sets the number of bits to delay the ESG's response to an external trigger.

The bit delay is a delay between when the ESG receives the trigger and when it responds to the trigger. The delay uses the clocks of the bit-clock to time the delay. After the ESG receives the trigger and the set number of delay bits (clocks) occurs, the ESG transmits the data pattern.

The delay occurs after you enable the state. See ":TRIGger[:SOURce]:EXTernal:DELay:STATe" on page 628. You can set the number of bits either before or after enabling the state.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 625.

***RST** +0

Range 0–1048575

Key Entry **Ext Delay Bits**

:TRIGger[:SOURce]:EXTernal:SLOPe

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:TRIGger[:SOURce]:EXTernal:SLOPe POSitive|NEGative
[:SOURce]:RADio:DECT:TRIGger[:SOURce]:EXTernal:SLOPe?
```

This command sets the polarity for an external trigger signal while using the continuous, single triggering mode. To set the polarity for gating, see ":TRIGger:TYPE:GATE:ACTive" on page 625.

The POSitive and NEGative selections correspond to the high (positive) and low (negative) states of the external trigger signal. For example, when you select POSitive, the waveform responds (plays) during the high state of the trigger signal. When the ESG receives multiple trigger occurrences when only one is required, the signal generator uses the first trigger and ignores the rest.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 625.

***RST** NEG

Key Entry **Ext Polarity Neg Pos**

:TRIGger[:SOURce]:EXTernal[:SOURce]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:TRIGger[:SOURce]:EXTernal[:SOURce] EPT1|EPT2|
EPTRIGGER1|EPTRIGGER2
[:SOURce]:RADio:DECT:TRIGger[:SOURce]:EXTernal[:SOURce]?
```

This command selects which PATTERN TRIG IN connection the ESG uses to accept an externally applied trigger signal when external is the trigger source selection.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 625. For more information on the rear-panel connectors, see the *E4428C/38C ESG Signal Generators User's Guide*.

The following list describes the command choices:

EPT1 This choice is synonymous with EPTRIGGER1 and selects the PATTERN TRIG IN rear-panel connector.

EPT2 This choice is synonymous with EPTRIGGER2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.

EPTRIGGER1 This choice is synonymous with EPT1 and selects the PATTERN TRIG IN rear-panel connector.

EPTRIGGER2 This choice is synonymous with EPT2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.

***RST** EPT1

Key Entry **Patt Trig In 1** **Patt Trig In 2**

:TRIGger[:SOURce]:EXTernal:DELay:STATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT:TRIGger[:SOURce]:EXTernal:DELay:STATe ON|OFF|1|0
[:SOURce]:RADio:DECT:TRIGger[:SOURce]:EXTernal:DELay:STATe?
```

This command enables or disables the operating state of the external trigger delay function.

For setting the delay time, see ":TRIGger[:SOURce]:EXTernal:DELay" on page 626, and for more information on configuring an external source, see":TRIGger[:SOURce]" on page 625.

***RST** 0

Key Entry **Ext Delay Off On**

[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:DECT[:STATe] ON|OFF|1|0
[:SOURce]:RADio:DECT[:STATe]?
```

This command enables or disables the DECT modulation format.

***RST** 0

Key Entry **Dect Off On**

Remarks Although the DECT modulation is enabled with this command, the RF carrier is not modulated unless you enable the modulation by pressing the front panel **Mod On/Off** hardkey.

EDGE Subsystem–Option 402 ([:SOURce]:RADio:EDGE)

:ALPHa

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:ALPHa <val>
[:SOURce]:RADio:EDGE:ALPHa?
```

This command changes the Nyquist or root Nyquist filter's alpha value.

The filter alpha value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +5.00000000E–001

Range 0.000–1.000

Key Entry **Filter Alpha**

Remarks To change the current filter type, refer to ":FILTer" on page 641.

:BBCLock

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:BBCLock INT[1]|EXT[1]
[:SOURce]:RADio:EDGE:BBCLock?
```

This command toggles the data (bit) clock input to the baseband generator board to either internal or external. This command is independent in each mode and works for both non-burst (continuous) and burst modes. This allows for a matrix of selections between burst/non-burst, internal/external data generation, internal/external data clock, and external bit/symbol data clock.

INT[1] This choice selects the signal generator internal data clock.

EXT[1] This choice selects an external data clock input.

***RST** INT

Key Entry **Ext Data Clock Ext Int**

Remarks A data clock or continuous symbol sync input must be supplied when

external mode is used.

This will be ignored if the external reference is set to EXTernal. To change the external reference type, refer to ":EREFerence" on page 640.

:BBT

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:BBT <val>
[:SOURce]:RADio:EDGE:BBT?
```

This command changes the bandwidth-multiplied-by-bit-time (BbT) filter parameter.

The filter BbT value can be set to the maximum level (1) or in between the minimum level (0.100) and maximum level by using fractional numeric values (0.101–0.999).

***RST** +3.00000000E–001

Range 0.100–1.000

Key Entry **Filter BbT**

Remarks This command is effective only after choosing a Gaussian filter. It does not have an effect on other types of filters.

To change the current filter type, refer to “:FILTer” on page 641.

:BURSt:SHAPe:FALL:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:BURSt:SHAPe:FALL:DELay <val>
[:SOURce]:RADio:EDGE:BURSt:SHAPe:FALL:DELay?
```

This command sets the period of time that the start of the burst fall is delayed.

The variable <val> is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +0.00000000E+000

Range –16.2000 to 99

Key Entry **Fall Delay**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 644. Refer to ":SRATe" on page 665 for a list of minimum and maximum symbol rate values.

":BURSt:SHAPe:FDELay" on page 631 performs the same function. In compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:FDELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:BURSt:SHAPe:FDELay <val>
[:SOURce]:RADio:EDGE:BURSt:SHAPe:FDELay?
```

This command sets the period of time that the start of the burst fall is delayed.

The variable <val> is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +0.00000000E+000

Range –16.2000 to 99

Key Entry **Fall Delay**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 644. Refer to ":SRATe" on page 665 for a list of minimum and maximum symbol rate values.

":BURSt:SHAPe:FALL:DELay" on page 630 performs the same function. In compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:FALL:TIME

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:BURSt:SHAPe:FALL:TIME <val>
[:SOURce]:RADio:EDGE:BURSt:SHAPe:FALL:TIME?
```

This command sets the period of time where the burst decreases from full power to minimum power.

The variable <val> is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +1.00000000E+001

Range 0.2000–409.2000

Key Entry **Fall Time**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 644. Refer to ":SRATe" on page 665 for a list of minimum and maximum symbol rate values.

":BURSt:SHAPe:FTIMe" on page 632 performs the same function. In compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:FTIMe

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:BURSt:SHAPe:FTIMe <val>
[:SOURce]:RADio:EDGE:BURSt:SHAPe:FTIMe?
```

This command sets the period of time where the burst decreases from full power to minimum power.

The variable <val> is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +0.00000000E+000

Range 0.2000–409.2000

Key Entry **Fall Time**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 644. Refer to ":SRATe" on page 665 for a list of minimum and maximum symbol rate values.

":BURSt:SHAPe:FALL:TIME" on page 632 performs the same function. In compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:RDELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:BURSt:SHAPe:RDELay <val>
[:SOURce]:RADio:EDGE:BURSt:SHAPe:RDELay?
```

This command sets the period of time that the start of the burst rise is delayed.

The variable <val> is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +0.00000000E+000

Range –7.2000 to 99

Key Entry **Rise Delay**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 644. Refer to ":SRATe" on page 665 for a list of minimum and maximum symbol rate values.

":BURSt:SHAPe:RISE:DELay" on page 634 performs the same function. In compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:RISE:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:BURSt:SHAPe:RISE:DELay <val>
[:SOURce]:RADio:EDGE:BURSt:SHAPe:RISE:DELay?
```

This command sets the period of time that the start of the burst rise is delayed.

The variable <val> is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +0.00000000E+000

Range –7.2000 to 99

Key Entry **Rise Delay**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 644. Refer to ":SRATe" on page 665 for a list of minimum and maximum symbol rate values.

":BURSt:SHAPe:RDELay" on page 633 performs the same function. In compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:RISE:TIME

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:BURSt:SHAPe:RISE:TIME <val>
[:SOURce]:RADio:EDGE:BURSt:SHAPe:RISE:TIME?
```

This command sets the period of time where the burst increases from a minimum power to full power.

The variable <val> is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +1.00000000E+001

Range 0.2000–16.4000

Key Entry **Rise Time**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 644. Refer to ":SRATe" on page 665 for a list of minimum and maximum symbol rate values.

":BURSt:SHAPe:RTIMe" on page 635 performs the same function. In compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:RTIMe

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:BURSt:SHAPe:RTIMe <val>
[:SOURce]:RADio:EDGE:BURSt:SHAPe:RTIMe?
```

This command sets the period of time where the burst increases from a minimum power to full power.

The variable <val> is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +1.00000000E+001

Range 0.2000–16.4000

Key Entry **Rise Time**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 644. Refer to ":SRATe" on page 665 for a list of minimum and maximum symbol rate values.

":BURSt:SHAPe:RISE:TIME" on page 634 performs the same function. In compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:BURSt:SHAPe[:TYPE] SINE|"<file name>"
[:SOURce]:RADio:EDGE:BURSt:SHAPe[:TYPE]?
```

This command sets the burst shape type.

SINE This choice selects a burst shape defined by the burst rise and fall *RST values.

"<file name>" This choice selects a user-defined file from signal generator memory.

***RST** SINE

Key Entry **Sine** **User File**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:BURSt[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:BURSt[:STATe] ON|OFF|1|0
[:SOURce]:RADio:EDGE:BURSt[:STATe]?
```

This command enables or disables the burst function.

ON (1) This choice enables the transmission of framed data. If all timeslots which are switched on are up traffic channels or custom, you will be bursting the timeslots that are on; there will be no RF carrier during the off timeslots.

If you have switched on any timeslot that you have configured as a down traffic channel, the RF carrier is not switched off between any of the timeslots. The off timeslots are transmitted as a continuous series of ones for the time period of the off timeslots.

OFF (0) This choice enables the transmission of unframed data.

***RST** 0

Key Entry **Data Format Pattern Framed**

:CHANnel

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:CHANnel EVM|ACP
[:SOURce]:RADio:EDGE:CHANnel?
```

This command optimizes the Nyquist and root Nyquist filters to minimize error vector magnitude (EVM) or to minimize adjacent channel power (ACP).

EVM	This choice provides the most ideal passband.
ACP	This choice improves stopband rejection.
***RST**	ACP
Key Entry	**Optimize FIR For EVM ACP**
Remarks	To change the current filter type, refer to ":FILTer" on page 641.

:DATA

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:DATA PN9|PN11|PN15|PN20|PN23|FIX4|"<file name>"|EXT|
P4|P8|P16|P32|P64|PRAM
[:SOURce]:RADio:EDGE:DATA?
```

This command sets the data pattern type (pseudo-random number sequence, 4-bit pattern, sequence of 1's and 0's, data from an external source, or a user file) for unframed data transmission.

***RST**	PN9
Key Entry	**PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **Ext** **4 1's & 4 0's** **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's** **64 1's & 64 0's** **PRAM File**
Remarks	Refer to "File Name Variables" on page 13 for information on the file name syntax.

:DATA:PRAM

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:DATA:PRAM "<file_name>"
[:SOURce]:RADio:EDGE:DATA:PRAM?
```

This command selects a pattern RAM (PRAM) file as the pattern data type for the EDGE (Enhanced Data GSM Environment) format.

`"<file_name>"` This variable designates the PRAM file in WFM1. Refer to "File Name Variables" on page 13 for information on the file name syntax.

Key Entry **PRAM File**

Remarks Selecting this data source forces the burst source to `INTernal` to allow framing control.

The PRAM file must reside in the signal generator's volatile memory (WFM1) in order to be accessed by this command. For more information on PRAM files, refer to ":DATA:PRAM:FILE:BLOCk" on page 112

:DATA:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:DATA:FIX4 <val>
[:SOURce]:RADio:EDGE:DATA:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern for unframed transmission according to the modulation type, symbol rate, filter, and burst shape selected for the EDGE modulation format.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks `FIX4` must already be defined as the data type.

To change the data type, refer to ":DATA" on page 637.

:DEFault

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:DEFault
```

This command returns all of the EDGE modulation format parameters to factory settings. It does not affect any other signal generator parameters.

Key Entry **Restore EDGE Factory Default**

:EDATa:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:EDATa:DELay?
```

This query returns the amount of delay (in symbols) from the external data input to the beginning of the symbol on the I OUT and Q OUT rear panel connectors and the front panel RF OUTPUT connector.

***RST** +0.00000000E+000

Remarks When the EDGE format is turned off, the delay value is unchanged; the query will return the same delay value if the format is on or off.

:EDCLock

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:EDCLock SYMBol|NORMal
[:SOURce]:RADio:EDGE:EDCLock?
```

This command sets the external data clock use.

SYMBol This choice specifies that a continuous symbol clock signal must be provided to the SYMBOL SYNC input connector.

NORMal This choice specifies that the DATA CLOCK input connector requires a bit clock. The SYMBOL SYNC input connector requires a (one-shot or continuous) symbol sync signal.

***RST** NORM

Key Entry **Ext Data Clock Normal Symbol**

Remarks Both choices have no effect in internal clock mode. Refer to ":BBCLock" on page 629 to select EXT as the data clock type.

:EREFerence

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:EREFerence INT|EXT
[:SOURce]:RADio:EDGE:EREFerence?
```

This command selects either an internal or external bit-clock reference for the data generator.

***RST** INT

Key Entry **BBG Ref Ext Int**

Remarks If the EXT choice is selected, the external source's frequency value must be applied to the BASEBAND GEN REF IN rear panel connector. The external reference and external data clock are not applicable at the same time. If both are selected, then the external reference takes precedence.

Refer to, ":EREFerence:VALue" on page 640 to enter the external reference frequency setting.

:EREFerence:VALue

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:EREFerence:VALue <val>
[:SOURce]:RADio:EDGE:EREFerence:VALue?
```

This command sets the expected bit-clock reference frequency value for an externally applied reference signal.

The variable <val> is expressed in units of hertz (Hz–MHz).

***RST** +1.30000000E+007

Range 2.5E5–1E8

Key Entry **Ext BBG Ref Freq**

Remarks The value specified by this command is effective only when you are using an external reference applied to the BASEBAND GEN REF IN rear panel connector.

Refer to ":EREFerence" on page 640 to select EXT (external source) as the reference for the bit-clock.

:FILTer

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:FILTer RNYQuist|NYQuist|GAUSsian|RECTangle|IS95|
IS95_EQ|IS95_MOD|IS95_MOD_EQ|EDGE|AC4Fm|UGGaussian|"<user FIR>"
[:SOURce]:RADio:EDGE:FILTer?
```

This command selects the pre-modulation filter type.

IS95 This choice selects a filter that meets the criteria of the IS-95 standard.

IS95_EQ This choice selects a filter which is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard. This filter is only used for IS-95 baseband filtering.

IS95_MOD This choice selects a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.

IS95_MOD_EQ This choice selects a filter which is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance), with lower passband rejection.

EDGE This choice selects Laurant's decomposition of a Gaussian filter with a 0.300 fixed BbT.

AC4Fm This choice selects a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.

UGGaussian This choice selects a backwards compatible GSM Gaussian filter (Gaussian filter with a fixed BbT value of 0.300) for the ESG E44xxB Option UN3 or UN4.

"<user FIR>" This variable is any filter file that you have stored into memory.

***RST** EDGE

Key Entry **Root Nyquist** **Nyquist** **Gaussian** **Rectangle** **IS-95** **IS-95 w/EQ**

IS-95 Mod **IS-95 Mod w/EQ** **EDGE** **APCO 25 C4FM**

UN3/4 GSM Gaussian **User FIR**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:IQ:SCALe

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:IQ:SCALe <val>
[:SOURce]:RADio:EDGE:IQ:SCALe?
```

This command sets the amplitude of the I/Q outputs for better adjacent channel power (ACP); lower scaling values equate to better ACP.

The variable <val> is expressed in units of percent.

***RST** +113

Range 1–200

Key Entry **I/Q Scaling**

Remarks This command has no effect with MSK or FSK modulation.

:MODulation:FSK[:DEViation]

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:MODulation:FSK[:DEViation] <val>
[:SOURce]:RADio:EDGE:MODulation:FSK[:DEViation]?
```

This command sets the symmetric FSK frequency deviation value.

The variable <val> is expressed in units of Hertz and the maximum range value equals the current symbol rate value multiplied by four, limited to 20 MHz.

***RST** +4.00000000E+002

Range 0–2E7

Key Entry **Freq Dev**

Remarks To change the modulation type, refer to ":MODulation[:TYPE]" on page 644.

Refer to ":SRATe" on page 665 for a list of minimum and maximum symbol rate values.

To set an asymmetric FSK deviation value, refer to the *E4428C/38C ESG Signal Generators User's Guide* for more information.

:MODulation:MSK[:PHASe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:MODulation:MSK[:PHASe] <val>
[:SOURce]:RADio:EDGE:MODulation:MSK[:PHASe]?
```

This command sets the MSK phase deviation value.

The variable <val> is expressed in units of degrees.

***RST** +9.00000000E+001

Range 0–100

Key Entry **Phase Dev**

:MODulation:UFSK

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:MODulation:UFSK "<file name>"
[:SOURce]:RADio:EDGE:MODulation:UFSK?
```

This command selects a user-defined FSK file from the signal generator memory.

Key Entry **User FSK**

Remarks The user-defined FSK file is held in signal generator memory until the command that selects user FSK as the modulation type is sent. Refer to ":MODulation[:TYPE]" on page 644 to change the current modulation type.

Refer to "File Name Variables" on page 13 for information on the file name syntax.

:MODulation:UIQ

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:MODulation:UIQ "<file name>"
[:SOURce]:RADio:EDGE:MODulation:UIQ?
```

This command selects a user-defined I/Q file from the signal generator memory.

Key Entry **User I/Q**

Remarks The user-defined I/Q file is held in signal generator memory until the command that selects user I/Q as the modulation type is sent. Refer to ":MODulation[:TYPE]" on page 644 to change the current modulation type.

Refer to "File Name Variables" on page 13 for information on the file name syntax.

:MODulation[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:MODulation[:TYPE] BPSK|QPSK|IS95QPSK|GRAYQPSK|
OQPSK|IS95OQPSK|P4DQPSK|PSK8|PSK16|D8PSK|MSK|FSK2|FSK4|FSK8|FSK16|C4FM|
QAM4|QAM16|QAM32|QAM64|QAM128|QAM256|EDGE|UIQ|UFSK
[:SOURce]:RADio:EDGE:MODulation[:TYPE]?
```

This command sets the modulation type for the EDGE personality.

***RST** EDGE

Key Entry **BPSK** **QPSK** **IS-95 QPSK** **Gray Coded QPSK** **OQPSK**

IS-95 OQPSK **π/4 DQPSK** **8PSK** **16PSK** **D8PSK** **MSK** **2-Lvl FSK**

4-Lvl FSK **8-Lvl FSK** **16-Lvl FSK** **C4FM** **4QAM** **16QAM** **32QAM**

64QAM **128QAM** **256QAM** **EDGE** **User I/Q** **User FSK**

:POLarity[:ALL]

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:POLarity[:ALL] NORMal|INVerted
[:SOURce]:RADio:EDGE:POLarity[:ALL]?
```

This command sets the rotation direction for the phase modulation vector.

NORMal This choice selects normal phase polarity.

INVerted This choice inverts the internal Q signal.

***RST** NORM

Key Entry **Phase Polarity Normal Invert**

:SECondary:RECall

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SECondary:RECall
```

This command recalls the secondary frame configuration, overwriting the current frame.

Key Entry **Recall Secondary Frame State**

Remarks To save a secondary frame state, refer to ":SECondary:SAVE" on page 645.

A secondary frame is not active until the secondary state is enabled. To activate a secondary frame, refer to ":SECondary[:STATe]" on page 646.

:SECondary:SAVE

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SECondary:SAVE
```

This command saves the current frame configuration as the secondary frame with the filename `EDGE_SECONDARY_FRAME`.

Key Entry **Save Secondary Frame State**

Remarks To recall the secondary frame (saved in non-volatile signal generator memory), refer to ":SECondary:RECall" on page 645.

:SECondary:TRIGger[:SOURce]

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SECondary:TRIGger[:SOURce] KEY|EXT|BUS
[:SOURce]:RADio:EDGE:SECondary:TRIGger[:SOURce]?
```

This command selects the type of triggering for the secondary frame.

KEY This choice enables triggering by pressing the front panel **Trigger** hardkey.

EXT This choice enables triggering using an externally applied signal at the PATT TRIG IN rear panel connector or the PATT TRIG IN 2 pin on the rear panel AUX I/O connector. To select the appropriate connection, refer to ":TRIGger[:SOURce]:EXTernal[:SOURce]" on page 672.

BUS This choice enables GPIB triggering using the `*TRG` or `GET` command or LAN and RS-232 triggering using the `*TRG` command.

Key Entry **Trigger Key** **Ext** **Bus**

:SECondary[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SECondary[:STATe] ON|OFF|1|0
[:SOURce]:RADio:EDGE:SECondary[:STATe]?
```

This command enables or disables the ability to switch to the secondary frame.

***RST** 0

Key Entry **Secondary Frame Off On**

Remarks A frame must already be saved as the secondary frame in order to turn the secondary state function on.

To save a frame as the secondary frame, refer to ":SECondary:SAVE" on page 645.

:SLOT0|[1]|2|3|4|5|6|7:CUSTom

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:CUSTom PN9|PN11|PN15|PN20|
PN23|FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:CUSTom?
```

This command sets the data pattern type (pseudo-random number sequence, 4-bit pattern, sequence of 1's and 0's, data from an external source, or a user file) for framed data transmission.

***RST** PN9

Key Entry **PN9** **PN15** **FIX4** **User File** **Ext** **4 1's & 4 0's** **8 1's & 8 0's**

16 1's & 16 0's **32 1's & 32 0's** **64 1's & 64 0's**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

Refer to ":SLOT0|[1]|2|3|4|5|6|7[:TYPE]" on page 663

:SLOT0|[1]|2|3|4|5|6|7:CUSTom:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:CUSTom:FIX4 <val>
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:CUSTom:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected custom timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type.

To change the data type, refer to ":SLOT0|[1]|2|3|4|5|6|7:CUSTom" on page 646.

:SLOT0|[1]|2|3|4|5|6|7:CUSTom:GUARd

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:CUSTom:
GUARd <24 or 27 bit_pattern>
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:CUSTom:GUARd?
```

This command defines the hexadecimal value for the guard time field in the selected custom timeslot.

***RST** Timeslots 0 & 4: #H7FFFFFF

Timeslots: 1, 2, 3, 5, 6, &7: #H0FFFFFF

Range Timeslots 0 & 4: #H0–#H7FFFFFF

Timeslots: 1, 2, 3, 5, 6, &7: #H0–#H0FFFFFF

Key Entry **G**

Remarks The guard time field is always modulated (but not bursted), even when the timeslot is off.

If the guard time and `T2` symbols of the current timeslot and the `T1` symbols of the next timeslot do not match, the burst shape may not be smooth (even if the current timeslot is turned off).

To change the current timeslot type, refer to ":SLOT0|[1]|2|3|4|5|6|7[:TYPE]" on page 663.

:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption PN9|PN15|
FIX4|"<file name>"|P4|P8|P16|P32|P64|TCHFS|CS1|CS4|DMCS1|UMCS1
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption?
```

This command selects the data pattern type or the multiframe channel (structure) for the selected GMSK timeslot.

There are two types of multiframe structures, a 26 and a 52 frame structure. The 26 frame structure has the following attributes:

- frame 12 contains the slow associated control channel (SACCH)
- frame 25 is idle and incorporates RF blanking

The 52 frame structure has the following attributes:

- frames 12 and 38 contain tail and control bits with the payload bits set to zero.
- Frames 25 and 51 are idle and incorporate RF blanking.

PN9, PN15	These choices are standard PN sequences. For bursted data, the PN sequences continuously repeat from one timeslot in a frame to the matching timeslot in the next frame.
FIX4	This choice selects a repeating 4-bit pattern.
"<file name>"	This choice selects a user-defined data file from signal generator memory. The file must supply enough bits to fill the desired number of timeslots. In timeslots where there is not enough bits to fill the encryption fields, the ESG ignores the data.
P4	This choice selects a data pattern with four ones followed by four zeros. The pattern repeats as needed to fill the encryption fields.
P8	This choice selects a data pattern with eight ones followed by eight zeros. The pattern repeats as needed to fill the encryption fields.
P16	This choice selects a data pattern with 16 ones followed by 16 zeros. The pattern repeats as needed to fill the encryption fields.
P32	This choice selects a data pattern with 32 ones followed by 32 zeros. The pattern repeats as needed to fill the encryption fields.
P64	This choice selects a data pattern with 64 ones followed by 64 zeros. The pattern repeats as needed to fill the encryption fields.
TCHFS	This multiframe choice selects a traffic channel with full rate speech (TCH/FS).

CS-1	This multiframe choice selects the packet data traffic channel that uses the packet data block type 1 coding scheme in accordance with the 3GPP standard GSM 05.03.
CS4	This multiframe choice selects the packet data traffic channel that uses the packet data block type 4 coding scheme in accordance with the 3GPP standard GSM 05.03.
DMCS1	This multiframe choice selects the downlink packet data traffic channel that uses the packet data block type 5 modulation and coding scheme in accordance with the 3GPP standard GSM 05.03.
UMCS1	This multiframe choice selects the uplink packet data traffic channel that uses the packet data block type 5 modulation and coding scheme in accordance with the 3GPP standard GSM 05.03.

***RST** PN9

Key Entry **PN9** **PN15** **FIX4** **User File** **Ext** **4 1’s & 4 0’s** **8 1’s & 8 0’s**

16 1’s & 16 0’s **32 1’s & 32 0’s** **64 1’s & 64 0’s** **TCH/FS** **CS-1**

CS-4 **Downlink MCS-1** **Uplink MCS-1**

:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption:CS1:DATA

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption:CS1:DATA PN9|
PN15
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption:CS1:DATA?
```

This command selects the encryption field data for the selected GMSK timeslot that uses the packet data block type 1 coding scheme.

***RST** PN9

Key Entry **PN9** **PN15**

Remarks Refer to “:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption” on page 648 for selecting the coding scheme.

:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption:CS4:DATA

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption:CS4:DATA PN9|
PN15
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption:CS4:DATA?
```

This command selects the encryption field data for the selected GMSK timeslot that uses the packet data block type 4 coding scheme.

***RST** PN9

Key Entry **PN9** **PN15**

Remarks Refer to ":SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption" on page 648 for selecting the coding scheme.

:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption:DLINk:MCS1:DATA

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption:DLINk:MCS1:
DATA PN9|PN15
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption:DLINk:MCS1:
DATA?
```

This command selects the encryption field data for the selected GMSK timeslot that uses the downlink packet data block type 5 modulation and coding scheme.

***RST** PN9

Key Entry **PN9** **PN15**

Remarks Refer to ":SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption" on page 648 for selecting the coding scheme.

:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption:FIX4 <val>
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption:FIX4?
```

This command sets the encryption field with a 4-bit binary repeating data pattern for the selected GMSK timeslot.

The variable <val> accepts values in binary, hexadecimal, or decimal format, however the query returns only binary values.

***RST** #B0000

Range 0–15

Key Entry **FIX4**

Remarks Refer to ":SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption" on page 648 for selecting the data type.

:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption:TCH:FS:DATA

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption:TCH:FS:
DATA PN9|PN15
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption:TCH:FS:DATA?
```

This command sets the encryption field data for the selected GMSK timeslot configured as the traffic channel with full speech (TCH/FS).

***RST** PN9

Key Entry **PN9** **PN15**

Remarks Refer to ":SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption" on page 648 for selecting the TCH/FS.

:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption:ULINk:MCS1:DATA

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption:ULINk:MCS1:
DATA {PN9}|PN15
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption:ULINk:MCS1:
DATA?
```

This command selects the encryption field data for the selected GMSK timeslot that uses the uplink packet data block type 5 modulation and coding scheme.

***RST** PN9

Key Entry **PN9** **PN15**

Remarks Refer to ":SLOT0|[1]|2|3|4|5|6|7:GMSK:ENCRyption" on page 648 for selecting the coding scheme.

:SLOT0|[1]|2|3|4|5|6|7:GMSK:STEal

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:GMSK:STEal 0|1
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:GMSK:STEal?
```

This command specifies the stealing bit (1-bit S field) for the selected GMSK timeslot. The single bit defines the value for both stealing (S) fields.

The stealing flag field accepts values in binary, hexadecimal, or decimal format, however the query returns only hexadecimal values.

***RST** #H0

Key Entry **S**

:SLOT0|[1]|2|3|4|5|6|7:GMSK:TSEQuence

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:GMSK:TSEQuence TSC0|TSC1|
TSC2|TSC3|TSC4|TSC5|TSC6|TSC7|<26-bit pattern>
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:GMSK:TSEQuence?
```

This command changes the 26-bit training sequence (TS) for the selected GMSK timeslot.

The query returns the current training sequence hexadecimal value. Use the following table to match the hexadecimal values to the training sequences of TSC0–TSC7.

Training Sequence	Hexadecimal Value
TSC0	0970897
TSC1	0B778B7
TSC2	10EE90E
TSC3	11ED11E
TSC4	06B906B
TSC5	13AC13A
TSC6	29F629F
TSC7	3BC4BBC

***RST** #H0970897

Range	*<26-bit pattern>*: #H0–#H3FFFFFF
Key Entry	**TSC0** **TSC1** **TSC2** **TSC3** **TSC4** **TSC5** **TSC6** **TSC7** **Custom TS**

:SLOT0|[1]|2|3|4|5|6|7:MULTislot

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:MULTislot ON|OFF|1|0
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:MULTislot?
```

This command turns bursting (ramping) on or off between the selected timeslot and the next higher numbered adjacent timeslot.

ON (1)	This choice turns ramping off between timeslots.
OFF (0)	This choice turns ramping on between timeslots.
***RST**	0
Key Entry	**Multislot Off On**
Remarks	Turning multislot on between an EDGE and GMSK timeslot may produce undesired spectral content. The undesired spectral content is a byproduct of the transition between two different modulation types without ramping.

:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption

Supported E4438C with Options 402 or 416

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption PN9|PN11|
PN15|PN20|PN23|FIX4|"<filename>"|EXT|P4|P8|P16|P32|P64|DMCS9|UMCS9|DMCS5
|UMCS5|ETCHF43|UNCoded|EBCH1|EBCH2
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption?
```

This command selects the data pattern type or the multiframe channel (structure) for the selected normal timeslot.

There are two types of multiframe structures, a 26 and a 52 frame structure. The 26 frame structure has the following attributes:

- frame 12 contains the slow associated control channel (SACCH)
- frame 25 is idle and incorporates RF blanking

The 52 frame structure has the following attributes:

- frames 12 and 38 contain tail and control bits with the payload bits set to zero.
- Frames 25 and 51 are idle and incorporate RF blanking.

PN9–23	These choices are standard PN sequences. For bursted data, the PN sequences continuously repeat from one timeslot in a frame to the matching timeslot in the next frame.
FIX4	This choice selects a repeating 4-bit binary pattern.
`"<filename>"`	This choice selects a user-defined data file from signal generator memory. The file must supply enough bits to fill the desired number of timeslots. In timeslots where there are not enough bits to fill the encryption fields, the ESG ignores the data.
EXT	This choice selects an external user signal as the modulating data stream. Connect the externally supplied serial data signal to the front panel DATA BNC connector.

NOTE The EXT selection is not available when configuring both GMSK and EDGE normal timeslots for the same signal.

P4	This choice selects a data pattern with four ones followed by four zeros. The pattern repeats as needed to fill the encryption fields.
P8	This choice selects a data pattern with eight ones followed by eight zeros. The pattern repeats as needed to fill the encryption fields.
P16	This choice selects a data pattern with 16 ones followed by 16 zeros. The pattern repeats as needed to fill the encryption fields.
P32	This choice selects a data pattern with 32 ones followed by 32 zeros. The pattern repeats as needed to fill the encryption fields.
P64	This choice selects a data pattern with 64 ones followed by 64 zeros. The pattern repeats as needed to fill the encryption fields.
DMCS9	This multiframe choice selects the downlink packet data traffic channel that uses the packet data block type 13 modulation and coding scheme in accordance with the 3GPP standard GSM 05.03.
UMCS9	This multiframe choice selects the uplink packet data traffic channel that uses the packet data block type 13 modulation and coding scheme in accordance with the 3GPP standard GSM 05.03.
DMCS5	This multiframe choice selects the downlink packet data traffic channel that uses the packet data block type 9 modulation and coding scheme in accordance with the 3GPP standard GSM 05.03.
UMCS5	This multiframe choice selects the uplink packet data traffic channel that uses the packet data block type 9 modulation and coding scheme in accordance with the 3GPP standard GSM 05.03.

ETCH43	This multiframe choice selects an enhanced circuit switched full rate traffic channel with a user data rate of 43.2k-bits per second
Uncoded	This choice selects an uncoded channel.
EBCH1	This multiframe choice selects a *non-combined* broadcast channel for timeslot zero. Use this selection when timeslot zero is the only multiframe timeslot within the frame (timeslots 0–7). Trying to use a multiframe choice for another timeslot (timeslots 1–7) when timeslot zero is configured as a BCH, will create a settings conflict error.
EBCH2	This multiframe choice selects a *combined* broadcast channel for timeslot zero. Use this selection when timeslot zero is the only multiframe timeslot within the frame (timeslots 0–7). Trying to use a multiframe choice for another timeslot (timeslots 1–7) when timeslot zero is configured as a BCH, will create a settings conflict error.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1's & 4 0's **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's**

64 1's & 64 0's **Downlink MCS-9** **Uplink MCS-9** **Downlink MCS-5**

Uplink MCS-5 **E-TCH/F43.2** **Uncoded**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

To change the current timeslot type, refer to ":SLOT0|[1]|2|3|4|5|6|7[:TYPE]" on page 663.

:SLOT0:NORMal:ENCRyption:BCH:BCC

Supported E4438C with Option 416416

```
[:SOURce]:RADio:EDGE:SLOT0:NORMal:ENCRyption:BCH:BCC <val>
[:SOURce]:RADio:EDGE:SLOT0:NORMal:ENCRyption:BCH:BCC?
```

This command sets the broadcast control code (BCC) which is used to indicate what training sequence is being used by the basestation in the forward channels. This code will allow the mobile station to decode the other channels in the broadcast channel.

***RST** 0

Range 0–7

:SLOT0:NORMal:ENCRyption:BCH:CELLid

Supported E4438C with Option 416

```
[:SOURce]:RADio:EDGE:SLOT0:NORMal:ENCRyption:BCH:CELLid <val>
[:SOURce]:RADio:EDGE:SLOT0:NORMal:ENCRyption:BCH:CELLid?
```

This command sets the cell identification. The purpose of the cell identity information element is to identify a cell within a location area.

***RST** 0

Range 0–65535

:SLOT0:NORMal:ENCRyption:BCH:LAC

Supported E4438C with Option 416

```
[:SOURce]:RADio:EDGE:SLOT0:NORMal:ENCRyption:BCH:LAC <val>
[:SOURce]:RADio:EDGE:SLOT0:NORMal:ENCRyption:BCH:LAC?
```

This command sets the location area code (LAC). The location area code provides 16 bits to allow the administrator to define a location.

***RST** 0

Range 0–65535

:SLOT0:NORMal:ENCRyption:BCH:MCC

Supported E4438C with Option 416

```
[:SOURce]:RADio:EDGE:SLOT0:NORMal:ENCRyption:BCH:MCC <val>
[:SOURce]:RADio:EDGE:SLOT0:NORMal:ENCRyption:BCH:MCC?
```

This command sets the mobile country code (MCC). The mobile country code is a 12 bit number used to represent the country where the basestation is located.

***RST** 0

Range 0–4095

:SLOT0:NORMal:ENCRyption:BCH:MNC

Supported E4438C with Option 416

```
[:SOURce]:RADio:EDGE:SLOT0:NORMal:ENCRyption:BCH:MNC <val>
[:SOURce]:RADio:EDGE:SLOT0:NORMal:ENCRyption:BCH:MNC?
```

This command sets the mobile network code (MNC). The mobile network code is the individual number a network will be assigned.

***RST** 0

Range 0–255

Remarks Federal regulation mandates that a 3-digit MNC will be used. For the ESG implementation the upper four bits are set to 1111.

:SLOT0:NORMal:ENCRyption:BCH:PLMN

Supported E4438C with Option 416

```
[:SOURce]:RADio:EDGE:SLOT0:NORMal:ENCRyption:BCH:PLMN <val>
[:SOURce]:RADio:EDGE:SLOT0:NORMal:ENCRyption:BCH:PLMN?
```

This command is used to set the Public Land Mobile Network (PLMN) which is used to indicate the country the phone is in. PLMN is also referred to as the National Country Code (NCC).

***RST** 0

Range 0–7

:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:DLINk:MCS5:DATA

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:DLINk:MCS5:
DATA PN9|PN15
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:DLINk:MCS5:
DATA?
```

This command sets the data type (pseudo-random number sequence) for the enhanced general packet radio service (EGPRS) modulation and coding scheme 5 (MCS-5) downlink channel.

***RST** PN9

Key Entry **PN9** **PN15**

Remarks To select downlink MCS-5 as the multiframe channel type, refer to ":SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption" on page 653.

:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:DLINk:MCS9:DATA

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:DLINk:MCS9:
DATA PN9|PN15
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:DLINk:MCS9:
DATA?
```

This command sets the data type (pseudo-random number sequence) for the enhanced general packet radio service (EGPRS) modulation and coding scheme 9 (MCS-9) downlink channel.

***RST** PN9

Key Entry **PN9** **PN15**

Remarks To select downlink MCS-9 as the multiframe channel type, refer to ":SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption" on page 653.

:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:ETCH:F43:DATA

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:ETCH:F43:
DATA PN9|PN15
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:ETCH:F43:
DATA?
```

This command sets the data type (pseudo-random number sequence) for the enhanced, circuit switched, full-rate traffic channel with 43.2k-bits per second of user data (E-TCH/F43.2).

***RST** PN9

Key Entry **PN9** **PN15**

Remarks To select E-TCH/F43.2 as the multiframe channel type, refer to ":SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption" on page 653.

:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:FIX4 <val>
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern for framed transmission according to the modulation type, symbol rate, filter, and burst shape selected for the EDGE modulation format.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be selected as the data type.

To select FIX4 as the data type, refer to ":SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption" on page 653.

:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:ULINk:MCS5:DATA

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:ULINk:MCS5:
DATA PN9|PN15
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:ULINk:MCS5:
DATA?
```

This command sets the data type (pseudo-random number sequence) for the enhanced general packet radio service (EGPRS) modulation and coding scheme 5 (MCS-5) uplink channel.

***RST** PN9

Key Entry **PN9** **PN15**

Remarks To select uplink MCS-5 as the multiframe channel type, refer to ":SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption" on page 653.

:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:ULINk:MCS9:DATA

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:ULINk:MCS9:
DATA PN9|PN15
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:ULINk:MCS9:
DATA?
```

This command sets the data type (pseudo-random number sequence) for the enhanced general packet radio service (EGPRS) modulation and coding scheme 9 (MCS-9) uplink channel.

***RST** PN9

Key Entry **PN9** **PN15**

Remarks To select uplink MCS-9 as the multiframe channel type, refer to ":SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption" on page 653.

:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:UNCoded

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:
UNCoded PN9|PN15
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:
UNCoded?
```

This command sets the data type (pseudo-random number sequence) for an uncoded channel.

***RST** PN9

Key Entry **PN9** **PN15**

Remarks To select uncoded as the multiframe channel type, refer to ":SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption" on page 653.

:SLOT0|[1]|2|3|4|5|6|7:NORMal:GUARd

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:
GUARd <24 or 27 bit_pattern>
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:GUARd?
```

This command sets the hexadecimal value for the guard time field in the selected normal timeslot.

***RST** Timeslots 0 & 4: #H7FFFFFF

Timeslots: 1, 2, 3, 5, 6, &7: #H0FFFFFF

Range Timeslots 0 & 4: #H0–#H7FFFFFF

Timeslots: 1, 2, 3, 5, 6, &7: #H0–#H0FFFFFF

Key Entry **G**

Remarks The guard time field is always modulated (but not bursted), even when the timeslot is off.

If the guard time and `T2` symbols of the current timeslot and the `T1` symbols of the next timeslot do not match, the burst shape may not be smooth (even if the current timeslot is turned off).

To change the current timeslot type, refer to ":SLOT0|[1]|2|3|4|5|6|7[:TYPE]" on page 663.

:SLOT0|[1]|2|3|4|5|6|7:NORMal:T1

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:T1 <9 bit_pattern>
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:T1?
```

This command sets the hexadecimal value for the leading 9-bit tail field in the selected normal timeslot.

***RST** #H1FF

Range #H0–#H1FF

Key Entry **T1**

:SLOT0|[1]|2|3|4|5|6|7:NORMal:T2

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:T2 <9 bit_pattern>
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:T2?
```

This command sets the hexadecimal value for the trailing 9-bit tail field in the selected normal timeslot.

***RST** #H1FF

Range #H0–#H1FF

Key Entry **T2**

:SLOT0|[1]|2|3|4|5|6|7:NORMal:TSEQuence

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:TSEQuence TSC0|TSC1|
TSC2|TSC3|TSC4|TSC5|TSC6|TSC7|<78 bit_pattern>
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:NORMal:TSEQuence?
```

This command sets the 78-bit training sequence code for a normal timeslot to one of eight values or to create a custom value.

***RST** #H3F3F9E49FFF3FF3F9E49

Range <78 bit_pattern>: #H0–#H3FFFFFFFFFFFFFFFFFFF

Key Entry **TSC0** **TSC1** **TSC2** **TSC3** **TSC4** **TSC5** **TSC6** **TSC7** **Custom TS**

:SLOT0|[1]|2|3|4|5|6|7:LCAPacity:POWer

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:POWer MAIN|DELTa
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:POWer?
```

This command toggles the RF output power level function for the selected timeslot.

MAIN This choice specifies RF output as the main power level.

DELTa This choice specifies RF output as the alternative power level.

***RST** MAIN

Key Entry **Timeslot Ampl Main Delta**

:SLOT0|[1]|2|3|4|5|6|7:STATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:STATe ON|OFF|1|0
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7:STATe?
```

This command enables or disables the operating state of the selected timeslot.

***RST** Timeslot 0: 1 Timeslots 1–7: 0

Key Entry **Timeslot Off On**

:SLOT0|[1]|2|3|4|5|6|7[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7[:TYPE] CUSTom|NORMal|GMSK|
NORMAL_ALL
[:SOURce]:RADio:EDGE:SLOT0|[1]|2|3|4|5|6|7[:TYPE]?
```

This command sets the timeslot type for the selected timeslot.

CUSTom This choice selects a generic, non-standard timeslot configuration that consists of a data field and a guard field.

NORMal This choice selects a normal timeslot configuration for an EDGE signal.

GMSK This choice selects a normal GSM timeslot (GMSK modulation). Selecting a different EDGE modulation type does not change the GMSK modulation for a GMSK configured timeslot.

NORMAL_ALL This choice sets all timeslots to a normal timeslot configuration for an EDGE signal, regardless of the timeslot number selected.

***RST** NORM

Key Entry **Custom** **Normal** **GMSK** **Normal All**

:SOUT:

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SOUT FRAME|SLOT|ALL
[:SOURce]:RADio:EDGE:SOUT?
```

This command sets the synchronization location (within the pattern of data) and the type of output at the EVENT 1 rear panel connector.

FRAME This choice outputs a 1-bit signal, synchronized to the bit selected by the synchronization output offset command, for a framed data pattern.

SLOT This choice outputs a 1-bit signal, synchronized to the bit selected by the synchronization output offset command, for a selected timeslot.

ALL This choice outputs a 1-bit signal, synchronized to the bit selected by the synchronization output offset command, for all active timeslots.

***RST** FRAME

Key Entry **Begin Frame** **Begin Timeslot #** **All Timeslots**

Remarks To change the synchronization output offset value, refer to “:SOUT:OFFSet” on page 664.

:SOUT:OFFSet

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SOUT:OFFSet <val>
[:SOURce]:RADio:EDGE:SOUT:OFFSet?
```

This command sets the offset value for the location of the output synchronization signal on the EVENT1 rear panel connector relative to the beginning of the framed data pattern or timeslot.

The variable <val> is expressed in bits.

***RST** +0

Range –155 to 155

Key Entry **Sync Out Offset**

Remarks Negative values move the synchronization output signal earlier; positive values move it later.

To change the output of the EVENT1 rear panel connector to SLOT, refer to “:SOUT:” on page 664.

:SOUT:SLOT

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SOUT:SLOT <val>
[:SOURce]:RADio:EDGE:SOUT:SLOT?
```

This command selects the timeslot that will trigger a 1-bit output signal at the EVENT 1 rear panel connector.

***RST** +0

Range 0–7

Key Entry **Begin Timeslot #**

Remarks To change the output of the EVENT1 rear panel connector to SLOT, refer to ":SOUT:" on page 664.

:SRATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:SRATe <val>
[:SOURce]:RADio:EDGE:SRATe?
```

This command sets the transmission symbol rate.

The variable <val> is expressed in units of symbols per second (sps–Msps) and the maximum range value depends on the modulation type, and filter.

NOTE When using EDGE and GMSK, or multiframe EDGE, limit the symbol rate to no more than 271 ksps. Although higher rates may work, they are not supported.

***RST** +2.70833333E+005

Range

Modulation Type	Bits per Symbol	Internal Data
BPSK	1	1sps–50 Msps
FSK2		
MSK		
C4FM	2	1sps–50 Msps
FSK4		
OQPSK		
OQPSK195		
P4QPPSK		
QAM4		
QPSK		
QPSKIS95		
GRAYQPSK		
D8PSK	3	1sps–33.33 Msps
EDGE		
FSK8		
PSK8		
FSK16	4	1sps–25 Msps
PSK16		
QAM16		
QAM32	5	1sps–20 Msps
QAM64	6	1sps–16.67 Msps
QAM256	8	1sps–12.50 Msps

Key Entry **Symbol Rate**

Remarks When user-defined filters are selected using the command in section ":FILTer" on page 641, the upper bit rate will be restricted in line with the following symbol rate restriction:

- FIR filter length > 32 symbols: upper limit is 12.5 Msps
- FIR filter length > 16 symbols: upper limit is 25 Msps

When internal FIR filters are used, the limits of the above table always apply. For higher symbol rates, the FIR filter length will be truncated as follows:

- Above 12.5 Msps, the FIR length will be truncated to 32 symbols
- Above 25 Msps, the FIR length will be truncated to 16 symbols

  This will impact the relative timing of the modulated data, as well as the actual filter response.

When the symbol rate is changed, the ESG will reconfigure the baseband generator. The time required to reconfigure the baseband generator is inversely proportional to the symbol rate: lower symbol rates require more time.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 644.

NOTE	In the EDGE format with a GMSK modulated timeslot, the maximum symbol rate is 25 Msps for up to 16 symbol wide filters. For 32 symbol wide filters, the limit is 12.5 Msps.

:TRIGger:TYPE

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:TRIGger:TYPE CONTinuous|SINGle|GATE
[:SOURce]:RADio:EDGE:TRIGger:TYPE?
```

This command sets the trigger type.

CONTinuous The framed data sequence repeats continuously; the sequence restarts every time the previous playback is completed. To customize continuous triggering, refer to ":TRIGger:TYPE:CONTinuous[:TYPE]" on page 667.

SINGle The framed data sequence plays once for every trigger received.

GATE An external trigger signal interrupts the playback while the gating signal is in the inactive state. Playback resumes when the external control signal returns to the active state. The active state can be set to high or low.

***RST** CONT

Key Entry **Continuous** **Single** **Gated**

:TRIGger:TYPE:CONTinuous[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:TRIGger:TYPE:CONTinuous[:TYPE] FREE|TRIGger|RESet
[:SOURce]:RADio:EDGE:TRIGger:TYPE:CONTinuous[:TYPE]?
```

This commands selects the waveform's response to a trigger signal while using the continuous trigger mode.

For more information on triggering and to select the continuous trigger mode, see ":TRIGger:TYPE" on page 667.

The following list describes the waveform's response to each of the command choices:

FREE	Turning the ARB format on immediately triggers the waveform. The waveform repeats until you turn the format off, select another trigger, or choose another waveform file.
TRIGger	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously until you turn the format off, select another trigger, or choose another waveform file.
RESet	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously. Subsequent triggers reset the waveform to the beginning. For a waveform sequence, this means to the beginning of the first segment in the sequence.
***RST**	FREE
Key Entry	**Free Run** **Trigger & Run** **Reset & Run**

:TRIGger:TYPE:GATE:ACTive

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:TRIGger:TYPE:GATE:ACTive LOW|HIGH
[:SOURce]:RADio:EDGE:TRIGger:TYPE:GATE:ACTive?
```

This command selects the active state (gate polarity) of the gate while using the gating trigger mode.

The LOW and HIGH selections correspond to the low and high states of an external trigger signal. For example, when you select HIGH, the active state occurs during the high of the trigger signal. When the active state occurs, the ESG stops the waveform playback at the last played sample point, then restarts the playback at the next sample point when the inactive state occurs. For more information on triggering and to select gating as the trigger mode, see ":TRIGger:TYPE" on page 667.

The following list describes the ESG's gating behavior for the polarity selections:

LOW	The waveform playback stops when the trigger signal goes low (active state) and restarts when the trigger signal goes high (inactive state).
HIGH	The waveform playback stops when the trigger signal goes high (active state) and restarts when the trigger signal goes low (inactive state).
***RST**	HIGH
Key Entry	**Gate Active Low High**

:TRIGger[:SOURce]

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:TRIGger[:SOURce] KEY|EXT|BUS
[:SOURce]:RADio:EDGE:TRIGger[:SOURce]?
```

This command sets the trigger source.

For more information on triggering, see “:TRIGger:TYPE” on page 667. The following list describes the command choices:

KEY — This choice enables manual triggering by pressing the front-panel **Trigger** hardkey.

EXT — An externally applied signal triggers the waveform. This is the only choice that works with gating. The following conditions affect an external trigger:

- The input connector selected for the trigger signal. You have a choice between the rear-panel PATTERN TRIG IN connector or the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector. To make the connector selection, see “:TRIGger[:SOURce]:EXTernal[:SOURce]” on page 672.

  For more information on the connectors and on connecting the cables, see the *E4428C/38C ESG Signal Generators User’s Guide*.

- The trigger signal polarity:

  — gating mode, see “:TRIGger:TYPE:GATE:ACTive” on page 668
  — continuous and single modes, see “:TRIGger[:SOURce]:EXTernal:SLOPe” on page 671

- The time delay between when the ESG receives a trigger and when the waveform responds to the trigger. There are two parts to setting the delay:

  — setting the amount of delay, see “:TRIGger[:SOURce]:EXTernal:DELay” on page 670
  — turning the delay on, see “:TRIGger[:SOURce]:EXTernal:DELay:STATe” on page 671

BUS — This choice enables triggering over the GPIB or LAN using the `*TRG` or `GET` commands or the AUXILIARY INTERFACE (RS-232) using the `*TRG` command.

***RST** KEY

Key Entry **Trigger Key** **Ext** **Bus**

:TRIGger[:SOURce]:EXTernal:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:TRIGger[:SOURce]:EXTernal:DELay <val>
[:SOURce]:RADio:EDGE:TRIGger[:SOURce]:EXTernal:DELay?
```

This command sets the number of bits to delay the ESG's response to an external trigger.

The bit delay is a delay between when the ESG receives the trigger and when it responds to the trigger. The delay uses the clocks of the bit-clock to time the delay. After the ESG receives the trigger and the set number of delay bits (clocks) occurs, the ESG transmits the data pattern.

The delay occurs after you enable the state. See ":TRIGger[:SOURce]:EXTernal:DELay:STATe" on page 671. You can set the number of bits either before or after enabling the state.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 669.

Example

:RAD:CUST:TRIG:EXT:DELay 200000

The preceding example sets the delay for an external trigger for 200K bits.

***RST** +0

Range 0–1048575

Key Entry **Ext Delay Bits**

Remarks For most TDMA formats, there is one bit per symbol. However, there are 3 bits per symbol for the EDGE format. If the selected number of delay bits is not a multiple of the number of bits per symbol, the entered value is rounded down to the next whole symbol value.

:TRIGger[:SOURce]:EXTernal:DELay:FINe

Supported E4438C with Option 416

```
[:SOURce]:RADio:EDGE:TRIGger[:SOURce]:EXTernal:DELay:FINe <val>
[:SOURce]:RADio:EDGE:TRIGger[:SOURce]:EXTernal:DELay:FINe?
```

This command sets the fine trigger delay for synchronizing the ESG.

The fine delay value is added to the coarse delay setting (see ":TRIGger[:SOURce]:EXTernal:DELay" on page 670).

The variable `<val>` is expressed as a fraction of one symbol. For the EDGE format, there are 3 bits per symbol.

***RST** +0.00000000E+000

Range 0–1

:TRIGger[:SOURce]:EXTernal:DELay:STATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:TRIGger[:SOURce]:EXTernal:DELay:STATe ON|OFF|1|0
[:SOURce]:RADio:EDGE:TRIGger[:SOURce]:EXTernal:DELay:STATe?
```

This command enables or disables the operating state of the external trigger delay function.

For setting the delay time, see ":TRIGger[:SOURce]:EXTernal:DELay" on page 670, and for more information on configuring an external source, see":TRIGger[:SOURce]" on page 669.

***RST** 0

Key Entry **Ext Delay Off On**

:TRIGger[:SOURce]:EXTernal:SLOPe

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:TRIGger[:SOURce]:EXTernal:SLOPe POSitive|NEGative
[:SOURce]:RADio:EDGE:TRIGger[:SOURce]:EXTernal:SLOPe?
```

This command sets the polarity for an external trigger signal while using the continuous, single triggering mode. To set the polarity for gating, see ":TRIGger:TYPE:GATE:ACTive" on page 668.

The POSitive and NEGative selections correspond to the high (positive) and low (negative) states of the external trigger signal. For example, when you select POSitive, the waveform responds (plays) during the high state of the trigger signal. When the ESG receives multiple trigger occurrences when only one is required, the signal generator uses the first trigger and ignores the rest.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 669.

***RST** NEG

Key Entry **Ext Polarity Neg Pos**

:TRIGger[:SOURce]:EXTernal[:SOURce]

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE:TRIGger[:SOURce]:EXTernal[:SOURce] EPT1|EPT2|
EPTRIGGER1|EPTRIGGER2
[:SOURce]:RADio:EDGE:TRIGger[:SOURce]:EXTernal[:SOURce]?
```

This command selects which PATTERN TRIG IN connection the ESG uses to accept an externally applied trigger signal when external is the trigger source selection.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 669. For more information on the rear-panel connectors, see the *E4428C/38C ESG Signal Generators User's Guide*.

The following list describes the command choices:

EPT1 This choice is synonymous with EPTRIGGER1 and selects the PATTERN TRIG IN rear-panel connector.

EPT2 This choice is synonymous with EPTRIGGER2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.

EPTRIGGER1 This choice is synonymous with EPT1 and selects the PATTERN TRIG IN rear-panel connector.

EPTRIGGER2 This choice is synonymous with EPT2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.

***RST** EPT1

Key Entry **Patt Trig In 1** **Patt Trig In 2**

[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:EDGE[:STATe] ON|OFF|1|0
[:SOURce]:RADio:EDGE[:STATe]?
```

This command enables or disables the EDGE modulation format.

***RST** 0

Key Entry **EDGE Off On**

Remarks Although the EDGE modulation is enabled with this command, the RF carrier is not modulated unless you also activate the front panel **Mod On/Off** hardkey.

9 Receiver Test Digital Commands (continued)

This chapter provides a continuation of SCPI descriptions for commands dedicated to digital real-time testing using the E4438C ESG Vector Signal Generator. This chapter contains the following sections:

3GPP W-CDMA HSPA Subsystem–Option 419 ([:SOURce]:RADio:WCDMa:HSPA[:BBG])

The commands in this subsystem support the remote functionality of the Signal Studio for 3GPP W-CDMA HSPA software. For a complete description of terms and HSPA functionality, refer to the software online help. Commands used for configuring the carrier signal and performing general signal generator functions are located in different SCPI command subsystems found within the SCPI Command Reference volumes.

There are two methods to determine the SCPI commands for a setup. One method is to locate each individual command listed in this subsystem and others within the *SCPI Command Reference* volumes. The other method is to use the HSPA software UI. After downloading a UI setup to the ESG, the software lets you export a SCPI file that contains the commands used in the UI setup. Refer to the HSPA software online help for information on this feature.

File Overview

The ESG's memory catalog (signal generator memory) uses several file types, each assigned with a unique syntax to recall the file. This section provides information on using files with SCPI commands.

This subsystem uses the following two command variables to represent two different file types stored in signal generator memory:

"<file name>"	Bit file
"<user FIR>"	FIR file

For more information on managing and using files, refer to the resources in the following list:

- "File Name Variables" on page 13 for information on the file name syntax
- Table 1-4 on page 14 for a listing of the different file types
- ESG Signal Generator *Programming Guide* for information on downloading bit files
- ESG Signal Generator *User's Guide* for information on creating and editing bit and FIR files using the signal generator

The HSPA software interface downloads user files (bit and FIR file types) to the ESG when **USER** is the software data or filter type selection. You can see these files on the ESG by pressing **Utility** > **Memory Catalog** > **Catalog Type** and then selecting the file type, or by using the SCPI commands located in the Memory subsystem. User files are located on the ESG in the following directory path: /USER/<file type directory>/<file name>. Table 9-1 shows the software naming convention for the different files created by the HSPA software.

Table 9-1 HSPA Software Downloaded File Names

Link Direction	Data Source	File Name	ESG File Type
Downlink and Uplink	Filter	<project name>–FIR	FIR
Downlink	BCH	<project name>–BCH	Bit
	PICH	<project name>–PICH	
	DCH	<project name>–DCH	
	DPCH	<project name>–DPCH	
	DCHx[a]	<project name>–DCHx[a]	
	Inter-TTI	<project name>–ITTIx[b]	
	HARQ ACK/NACK Pattern	<project name>–DLCPT	
	AMC CQI Pattern	<project name>–DLAPT	
	HS-DSCH	<project name>–DSCH1	
	HS-PDSCH	<project name>–HSPDx[b]	
	HS-SCCH	<project name>–HSSCCx[b]	
	E-AGCH Absolute Grant Scope	<project name>–EAGCH_AGS	
	E-AGCH Absolute Grant Value	<project name>–EAGCH_AGV	
	E-RGCH	<project name>–ERGCH	
	E-HICH	<project name>–EHICH	

Table 9-1 HSPA Software Downloaded File Names

Link Direction	Data Source	File Name	ESG File Type
Uplink	DPCCH	<project name>–DPCCH	Bit
	FBI	<project name>–FBI	
	TPC	<project name>–TPC	
	DPDCH	<project name>–DPDCH	
	DCHx[a]	<project name>–DCHx[a]	
	ACK Pattern	<project name>–APAT	
	CQI Pattern	<project name>–CPAT	
	EDPCCH Pattern	<project name>–EDPCCH	
	EDPDCH Pattern	<project name>–EDPDCH	
	EDCH Pattern	<project name>–EDCH	
	EDPDCH (alternate) Pattern	<project name>–EDCHA	
	HARQ ACK Pattern	<project name>–UAPT	
	TFC E-TFCI User Pattern	<project name>–UETT	
	Happy Bit Pattern	<project name>–HBIT	
	EXT Pattern	<project name>–EPAT	

a. x is the DCH number (1–6).
b. x is the channel number (1–4) for the HSDPA, the HS-PDSCH and the HS-SCCH.

Managing ESG Setting Conflicts and Error Messages

The ESG reports setting conflicts as error messages. When a setting conflict occurs, an error number and a brief message appear at the bottom of the ESG display. You can view the full text of the error message in either of two ways: by using the front panel of the ESG, or by executing SCPI commands.

Front Panel	Press **Utility** > **Error Info**.
SCPI	Execute the SCPI error commands described in the "System Subsystem (:SYSTem)" on page 154.

For more information on Error messages, refer to the signal generator *Programming Guide* for remote viewing or the signal generator *User's Guide* for front panel viewing.

:DLINk:APPLy

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:APPLy
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:APPLy?
```

This command applies changes to the channel setup and data for active downlink physical and transport channels, immediately starting the channel coding generation process. A progress bar may appear on the ESG display indicating that the new signal parameters are being applied. Signal parameters are also applied when the modulation format is turned on.

Use the query to determine whether or not execution of this command is required. It returns the following responses:

0	Command execution is not required.
1	Command execution is required.

NOTE The apply query response is valid only when downlink HSPA format is active.

The apply function will not work if there is a conflict with range values and coupled parameters. For example, if all the physical channel codes are not orthogonal to each other, the new settings are not applied to the signal when this command is executed. Resolve any conflicts before reapplying the changes. The ESG reports an error when conflicts occur.

:DLINk:AWGN:CN

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:AWGN:CN <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:AWGN:CN?
```

This command sets the downlink in-band carrier to noise ratio (C/N) value using AWGN.

***RST** 0

Range –30 to 30

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:AWGN[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:AWGN[:STATe] ON|OFF|0|1
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:AWGN[:STATe]?
```

This command turns the downlink AWGN on or off.

***RST** 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:BBCLock[:SOURce]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:BBCLock[:SOURce]
{INTernal}|EXTernal
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:BBCLock[:SOURce]?
```

This command selects the downlink baseband generator chip clock source, which is either internal to the signal generator or applied externally.

***RST** INT

Remarks When using an external chip clock source, connect the signal to the DATA CLOCK connector on the front panel of the ESG.

:DLINk:CPICh:CCODe

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:CPICh:CCODe?
```

This query returns the CPICH channelization code, which is always set to zero.

:DLINk:CPICh:POWer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:CPICh:POWer <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:CPICh:POWer?
```

This command sets the CPICH power level. The variable <val> is expressed in decibels (dB).

***RST** 3.30000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:CPICh[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:CPICh[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:CPICh[:STATe]?
```

This command turns the CPICH on or off.

***RST** 1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:DPCH:CCODe

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:CCODe <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:CCODe?
```

This command sets the downlink DPCH channel code number.

***RST** 10

Range 0–511

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

The channel code is coupled with the slot format and all other physical channel codes. If the channel code exceeds the limits of the slot format or if it is not orthogonal with all other physical channel codes, the apply function (downlink apply command) will not work. If any channel codes fail to meet this criteria, the apply function (downlink apply command) will not work.

:DLINk:DPCH:DATA

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DATA PN9|PN15|FIX4|DCH|
"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DATA?
```

This command configures the downlink DPCH data pattern.

DCH This selects the transport channel as the data source. The DCH selection is not available for a DPCH slot format of 16.

"<file name>" This represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (downlink apply command) will not work. Refer to "File Overview" on page 674 for more information on files.

***RST** PN9

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:DPCH:DATA:FIX4

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DATA:FIX4 <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DATA:FIX4?
```

This command sets the downlink DPCH repeating 4-bit binary data pattern.

The variable <val> accepts values in binary, hexadecimal, or decimal format; however, the query returns only binary values.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:DPCH:DCH[1]|2|3|4|5|6:BSIZe

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6
:BSIZe <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:BSIZe?
```

This command sets the block size for the selected downlink DCH.

***RST** 20

Range 0–5000

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

The number of data bits per DCH cannot exceed 200,000. To maintain this data bit limit, the ESG calculates the product of the block size and the number of blocks. If the product of these two parameters exceeds 200,000, the apply function (downlink apply command) will not work.

:DLINk:DPCH:DCH[1]|2|3|4|5|6:CRC

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:CRC 0|8|
12|16|24
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:CRC?
```

This command sets the number of CRC bits for the selected downlink DCH.

***RST** 8

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:DPCH:DCH[1]|2|3|4|5|6:CTYPe

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:CTYPe
HCONv|TCONv|TURBo|NONE
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:CTYPe?
```

This command sets the coder type for the selected downlink DCH.

HCONv This choice selects the 1/2 rate convolutional encoder.

TCONv This choice selects the 1/3 rate convolutional encoder.

TURBo This choice selects the turbo coder.

NONE This choice selects no coding.

***RST** HCON

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:DPCH:DCH[1]|2|3|4|5|6:DATA

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:DATA PN9|
PN15|FIX4|"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:DATA?
```

This command configures the data for the selected downlink DCH.

"<file name>" This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (downlink apply command) will not work. Refer to "File Overview" on page 674 for more information on files.

***RST** PN9

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:DPCH:DCH[1]|2|3|4|5|6:DATA:FIX4

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:DATA:
FIX4 <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:DATA:FIX4?
```

This command sets the repeating 4-bit binary data pattern for the selected downlink DCH. The variable <val> accepts values in binary, hexadecimal, or decimal format; however, the query returns only binary values.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:DPCH:DCH[1]|2|3|4|5|6:NBLocks

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:
NBLocks <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:NBLocks?
```

This command sets the number of data blocks for the selected downlink DCH.

***RST** 1

Range 0–512

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

The number of data bits per DCH cannot exceed 200,000. To maintain this data bit limit, the ESG calculates the product of the block size and the number of blocks. If the product of these two parameters exceeds 200,000, the apply function (downlink apply command) will not work.

:DLINk:DPCH:DCH[1]|2|3|4|5|6:RMATtribute

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:
RMATtribute <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:
RMATtribute?
```

This command sets the rate matching attribute for the selected downlink DCH.

***RST** 1

Range 1–256

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:DPCH:DCH[1]|2|3|4|5|6:TTI

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:TTI 10|20|
40|80
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:TTI?
```

This command sets the TTI for the selected downlink DCH.

The choices are expressed in millisecond (ms).

***RST** 10

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:DPCH:DCH[1]2|3|4|5|6[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DCH[1]2|3|4|5|6[:STATe]
ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:DCH[1]2|3|4|5|6[:STATe]?
```

This command turns the selected downlink DCH on or off; DCH1 is always on.

***RST** DCH 1: 1 DCH 2–6: 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

The apply command will not work and the ESG will report an error if you turn on a DCH where lower numbered DCHs are off. For example, turning on DCH5 requires turning on DCH2–4. The reverse is true when turning off the DCHs.

:DLINk:DPCH:POWer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:POWer <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:POWer?
```

This command sets the downlink DPCH power level.

***RST** –1.02000000E+001

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:DPCH:SFORmat

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:SFORmat <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:SFORmat?
```

This command configures the downlink DPCH slot format.

***RST** 0

Range 0–16

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

The slot format is coupled with the channel code, so a change in one value may require a change in the other. If the channel code exceeds the limits of the slot format or if it is not orthogonal with all other physical channel codes, the apply function (downlink apply command) will not work.

:DLINk:DPCH:SSCoffset

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:SSCoffset <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:SSCoffset?
```

This command sets the downlink DPCH secondary scrambling code offset.

***RST** +0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:DPCH:TFCI

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:TFCI <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:TFCI?
```

This command sets the TFCI 10-bit pattern for the downlink DPCH.

The variable <val> accepts values in binary, hexadecimal, or decimal format, however the query returns only binary values.

***RST** +0

Range 0–1023

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

Setting the TFCI bits is optional; they describe the type of service in use, for example voice or data.

:DLINk:DPCH:TOFFset

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:TOFFset <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:TOFFset?
```

This command adjusts the downlink DPCH timing offset.

The variable <val> is expressed in chips.

***RST** +0

Range 0–149

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:DPCH:TPC:NSTeps

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:TPC:NSTeps <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:TPC:NSTeps?
```

This command sets the number of steps for the down and up (DUP) or up and down (UDOWn) TPC pattern selections.

***RST** +1

Range 1–80

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:DPCH:TPC:PATTern

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:TPC:PATTern UDOWn|DUP|UALL|
DALL|"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:TPC:PATTern?
```

This command configures the downlink DPCH TPC pattern for increasing or decreasing, or increasing and decreasing the UE power level.

UDOWn	The TPC pattern repetitively steps up and down.
DUP	The TPC pattern repetitively steps down and up.
UALL	The TPC pattern consecutively steps up.
DALL	The TPC pattern consecutively steps down.
"<file name>"	This variable represents a TPC pattern file stored in signal generator memory. The pattern must contain at least one bit or the apply function (downlink apply command) will not work. Refer to “File Overview” on page 674 for more information on files.

***RST** UDOW

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

Each step in a TPC pattern signals an increase or decrease of 1 dB in the UE output power level.

:DLINk:DPCH:TRPosition

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH:TRPosition?
```

This query returns the downlink DPCH transport channel position that is always set to FIX.

:DLINk:DPCH[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:DPCH[:STATe]?
```

This command turns the downlink DPCH on or off.

***RST** 1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:EAGCh:AGSCope

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EAGCh:AGScope ALL_0|ALL_1|
"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EAGCh:AGScope?
```

This command sets an absolute scope pattern.

ALL_0, ALL_1 These choices configure an absolute grant scope pattern.

"<file name>" This variable represents an absolute scope pattern value.Create this file either by using the absolute grant scope pattern Data Type Entry window and downloading the file to the ESG, or by using the ESG Real Time W-CDMA table editor to create a bit file with the following bit patterns:

- absolute grant scope of 1, 0 using a 1-bit pattern, 1, 0. In the file, do not use delimiters between subframes; enter subframe bits as a binary string.

When creating a pattern, you can determine the number of active subframes, up to 1,280, which are numbered from 0 to 1,279. A subframe is active when it contains 1 bit.

***RST** ALL_0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:EAGCh:AGValue

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EAGCh:AGValue
ALL_0|ALL_1|ALL_2|ALL_3|ALL_4|ALL_5|ALL_6|ALL_7|ALL_8|ALL_9|ALL_10|ALL_1
1|ALL_12|ALL_13|ALL_14|ALL_15|ALL_16|ALL_17|ALL_18|ALL_19|ALL_20|ALL_21|
ALL_22|ALL_23|ALL_24|ALL_25|ALL_26|ALL_27|ALL_28|ALL_29|ALL_30|ALL_31|
"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EAGCh:AGValue?
```

This command sets an absolute grant value pattern.

ALL_1 to ALL_31	These choices configure an absolute grant value pattern.
"<file name>"	This variable represents an absolute grant pattern value.Create this file either by using the absolute grant value pattern Data Type Entry window and downloading the file to the ESG or by using the ESG Real Time W-CDMA table editor to create a bit file with the following bit patterns: • absolute grant value of 0– 31 using an 8-bit pattern, 00000000 to 00011111 In the file, do not use delimiters between subframes; enter subframe bits as a binary string. When creating a pattern, you can determine the number of active subframes, up to 1,280, which are numbered from 0 to 1,279. A subframe is active when it contains 8 bits. If a subframe contains at least 1 bit, but less than 8 bits, the apply function (downlink apply command) will not work.
***RST**	ALL_0
Remarks	Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:EAGCh:CCODe

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EAGCh:CCODe <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EAGCh:CCODe?
```

This command sets the downlink E-AGCH channel code number.

***RST** 14

Range 0–127

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

The channel code is coupled with the slot format and all other physical channel codes. Set the channel code so it does not exceed the limits of the slot format and ensure that all physical channel codes are orthogonal to each other. If any of the channel codes fail to meet this criteria, the apply function (downlink apply command) will not work.

:DLINk:EAGCh:ERNTI

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EAGCh:ERNTi <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EAGCh:ERNTi?
```

This command sets E-RNTI (E-DCH Radio Network Temporary Identifier).

***RST** 0

Range 0–255

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:EAGCh:Power

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EAGCh:POWer <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EAGCh:POWer?
```

This command sets the power level for the E-AGCH.

***RST** –20.00000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:EAGCh[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EAGCh[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EAGCh[:STATe]?
```

This command turns the downlink E-AGCH on or off.

***RST** 1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:EHICh:CCODe

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EHICh:CCODe <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EHICh:CCODe?
```

This command sets the downlink E-HICH channel code number.

***RST** 5

Range 0–127

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

The channel code is coupled with the slot format and all other physical channel codes. Set the channel code so it does not exceed the limits of the slot format and ensure that all physical channel codes are orthogonal to each other. If any of the channel codes fail to meet this criteria, the apply function (downlink apply command) will not work.

:DLINk:EHICh:INDicator

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EHICh:INDicator
ALL_1|ALL_0|ALL_M1|"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EHICh:INDicator?
```

This command sets a HARQ acknowledgement indicator pattern.

ALL_<val> These choices configure an HARQ acknowledgement indicator pattern.

"<file name>" This variable represents an HARQ pattern file stored in signal generator memory. Create this file either by using the HARQ pattern Data Type Entry window and downloading the file to the ESG, or by using the ESG Real Time W-CDMA table editor to create a bit file with the following bit patterns:

HARQ pattern of 1, 0, –1 using at 2-bit pattern: 01, 00, 10.
In the file, do not use delimiters between subframes; enter the subframe bits as a binary string.

When creating a pattern, you can determine the number of active subframes, from 1 to 1,280. The subrames are numbered 0 to 1,279. A subframe is active when it contains1 bit.

***RST** ALL_1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:EHICh:POWer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EHICh:POWer <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EHICh:POWer?
```

This command sets the power level for the E-HICH.

***RST** –20.00000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:EHICh:SSINdex

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EHICh:SSINdex <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EHICh:SSINdex?
```

This command sets the downlink E-HICH signature sequence index number.

***RST** 0

Range 0–39

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:EHICh:TOFFset

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EHICh:TOFFset <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EHICh:TOFFset?
```

This command adjusts the downlink E-HICH timing offset (tE-HICH).

***RST** –17920

Range –17920, –10240, 5120, 12800, 20480, 28160, 43520, 51200

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:EHICh[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EHICh[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:EHICh[:STATe]?
```

This command turns the downlink E-HICH on or off.

***RST** 1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:ERGCh:CCODe

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:ERGCh:CCODe <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:ERGCh:CCODe?
```

This command sets the downlink E-RGCH channel code number.

***RST** 6

Range 0–127

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:ERGCh:POWer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:ERGCh:POWer <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:ERGCh:POWer?
```

This command sets the power level for the E-ERGCH.

***RST** –20.00000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:ERGCh:RGValue

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:ERGCh:RGValue
ALL_1|ALL_0|ALL_M1|"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:ERGCh:RGValue?
```

This command sets a relative grant pattern.

ALL_<val> These choices configure a relative grant value pattern

"<file name>" This variable represents a relative grant value pattern file stored in signal generator memory. Create this file either by using the relative grant value pattern Data Type Entry window and downloading the file to the ESG, or by using the ESG Real Time W-CDMA table editor to create a bit file with the following bit patterns:

- relative grant value pattern of 1, 0, –1 using at 2-bit pattern: 01, 00, 10. In the file, do not use delimiters between subframes; enter subframe bits as a binary string.

When creating a pattern, you can determine the number of active subframes, from 1 to 1,280. The subrames are numbered 0 to 1,279. A subframe is active when it contains 1 bit.

***RST** ALL_1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:ERGCh:SSINdex

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:ERGCh:SSINdex <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:ERGCh:SSINdex?
```

This command sets the downlink E-RGCH signature sequence index number.

***RST** 0

Range 0–39

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:ERGCh:TOFFset

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:ERGCh:TOFFset <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:ERGCh:TOFFset?
```

This command adjusts the downlink E-RGCH timing offset (tE-RGCH).

The variable <val> is expressed in chips.

***RST** –17920

Range –17920, –10240, 5120, 12800, 20480, 28160, 43520, 51200

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:ERGCh[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:ERGCh[:STATe]ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:ERGCh[:STATe]?
```

This command turns the downlink E-RGCH on or off.

***RST** 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:FILTer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:FILTer RNYQuist|NYQuist|
GAUSsian|RECTangle|IS95|IS95_EQ|IS95_MOD|IS95_MOD_EQ|AC4Fm|UGGaussian|
"<user FIR>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:FILTer?
```

This command selects the downlink filter type.

IS95	This filter meets the criteria of the IS-95 standard.
IS95_EQ	This filter is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard and is best suited for IS-95 baseband filtering.
IS95_MOD	This filter meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.
IS95_MOD_EQ	This filter is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance), with lower passband rejection.
UGGaussian	This is a GSM Gaussian filter with a fixed BbT value of 0.300.
AC4Fm	This is a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.
"<user FIR>"	This variable represents any FIR filter file stored in signal generator memory. Refer to "File Overview" on page 674 for more information on files.

***RST** RNYQ

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:FILTer:ALPHa

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:FILTer:ALPHa <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:FILTer:ALPHa?
```

This command sets the downlink Nyquist or root Nyquist filter alpha value.

***RST** +2.20000000E–001

Range 0–1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

Executing this command while a filter other than Nyquist or root Nyquist is selected changes the parameter value, but it is not used by the signal generator until one of the Nyquist filters is selected.

:DLINk:FILTer:BBT

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:FILTer:BBT <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:FILTer:BBT?
```

This command sets the downlink Gaussian filter BbT value.

***RST** +5.00000000E–001

Range 0–1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

Executing this command while a filter other than the Gaussian filter is selected changes the parameter value, but it is not used by the signal generator until the Gaussian filter is selected.

:DLINk:FILTer:CHANnel

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:FILTer:CHANnel EVM|ACP
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:FILTer:CHANnel?
```

Execute this command to optimize a downlink filter for minimized EVM or for minimized ACP.

EVM This choice provides the most ideal passband.

ACP This choice improves stopband rejection for the root Nyquist and Nyquist filters.

***RST** EVM

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

To change the filter selection, refer to ":DLINk:FILTer" on page 696.

:DLINk:HSBurst

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSBurst ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSBurst?
```

This command sets the handling of the off slot periods for the downlink HSDPA channels.

ON|1	This choice turns off the ESG ALC feature and uses DTX during the off slots.
OFF|0	This choice continuously transmits the HSDPA channels filling the off slots with dummy bits.
***RST**	0
Remarks	Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:HSDPa:AMC:CQIMapping:UECategory

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:AMC:CQIMapping:
UECategory <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:AMC:CQIMapping:UECategory?
```

This command sets the UE category that determines the CQI mapping table per the 3GPP standards.

***RST**	5
Range	1–12
Remarks	To use this command's parameter in a setup, you must also set AMC as the feedback selection. Refer to the ":DLINk:HSDPa:FCONtrol" on page 700 for selecting the feedback type.

Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:HSDPa:AMC:CPATtern

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:AMC:CPATtern ALL_1|ALL_2|
ALL_3|ALL_4|ALL_5|ALL_6|ALL_7|ALL_8|ALL_9|ALL_10|ALL_11|ALL_12|ALL_13|
ALL_14|ALL_15|ALL_16|ALL_17|ALL_18|ALL_19|ALL_20|ALL_21|ALL_22|ALL_23|
ALL_24|ALL_25|ALL_26|ALL_27|ALL_28|ALL_29|ALL_30|"<file_name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:AMC:CPATtern?
```

This command sets a simulated UE CQI pattern that determines HSDPA1's response including the modulation type (QPSK or 16QAM) and the constellation version for 16QAM per the set UE category.

ALL_1 to ALL_30	These choices configure a simulated UE ACK response with a single CQI value for 1,280 subframes.
"<file name>"	This variable represents a CQI pattern file stored in signal generator memory.

Create this file either by using the AMC CQI pattern Data Type Entry window and downloading the file to the ESG, or by using the ESG Real Time W-CDMA table editor to create a bit file with the following bit patterns:

- CQI value of 1–30 using an 8-bit pattern, 00000001 to 00011110
- DTX is represented by 11111111

In the file, do not use delimiters between subframes; enter subframe bits as a binary string.

When creating a pattern, you can determine the number of active subframes from 1 to 1,280. The subframes are numbered 0 to 1,279. A subframe is active when it contains 8-bits. If a subframe contains at least 1-bit but less than 8-bits, the apply function (downlink apply command) will not work.

***RST** ALL_21

Remarks To use this command's parameter in a setup, you must also set AMC as the feedback selection. Refer to the ":DLINk:HSDPa:FCONtrol" on page 700 for selecting the feedback type.

Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:HSDPa:FCONtrol

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:FCONtrol NONE|HARQ|AMC
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:FCONtrol?
```

This command sets the HSDPA1 feedback control type.

NONE This choice turns off the feedback control.

HARQ This choice provides UE feedback using the HARQ process. This selection provides the capability of configuring a simulated UE ACK/NACK response, setting the maximum number of HARQ transmissions, and providing up to eight different RV parameters.

AMC This choice provides UE feedback using adaptive modulation coding. This selection provides the capability of configuring a simulated UE CQI response aligned with a UE category input.

***RST** NONE

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:HSDPa:HARQ:APATtern

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:HARQ:APATtern ACK_ALL|
"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:HARQ:APATtern?
```

This command sets a simulated UE ACK/NACK pattern that determines HSDPA1's HARQ response.

ACK_ALL This choice configures 1,280 subframes for a simulated ACK only response.

"<file name>" This variable represents an ACK pattern file stored in signal generator memory. Create this file either by using the HARQ ACK/NACK pattern Data Type Entry window and download the file to the ESG, or by using the ESG Real Time W-CDMA table editor to create a bit file with the following bit patterns:

- An ACK response is represented by 00.
- A NACK response is represented by 01.
- DTX is represented by 10.

In the file, do not use delimiters between subframes; enter subframe bits as a binary string.

When creating a pattern, you can determine the number of active subframes from 1 to 1,280. The subframes are numbered 0 to 1,279. A subframe is active when it contains 2-bits. If a subframe contains only 1-bit, the apply function (downlink apply command) will not work.

***RST** ACK_ALL

Remarks To use this command's parameter in a setup, you must also set HARQ as the feedback selection. Refer to the ":DLINk:HSDPa:FCONtrol" on page 700 for selecting the feedback type.

Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:HSDPa:HARQ:MNHTrans

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:HARQ:MNHTrans <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:HARQ:MNHTrans?
```

This command configures the HSDPA1 maximum number of HARQ transmissions for the HARQ function.

Use the command for UE performance testing or for specifying an arbitrary number of HARQ transmissions. When the software encounters a UE NACK response that is set by the HARQ ACK pattern command (see ":DLINk:HSDPa:HARQ:APATtern" on page 701), the software re-sends the same packet payload until either the maximum number of HARQ transmissions is reached or a simulated ACK response is encountered. Whenever the software re-sends the same packet payload, it also transmits another RV parameter that is configured by the RV sequence command.

***RST** 1

Range 1–8

Remarks To use this command's parameter in a setup, you must also set HARQ as the feedback selection. Refer to the ":DLINk:HSDPa:FCONtrol" on page 700 for selecting the feedback type.

Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:HSDPa:HARQ:RVSequence[1]|2|3|4|5|6|7|8

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:HARQ:RVSequence[1]|2|3|4|
5|6|7|8 <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:HARQ:RVSequence[1]|2|3|4|
5|6|7|8?
```

This command sets the HSDPA1 RV parameter sequence used with the maximum number of HARQ transmission setting. You can set eight different RV parameters for the RV sequence.

During simulated ACK responses, the software uses the first RV parameter. When the software encounters a simulated NACK response, it sends data using the next RV parameter. The software keeps incrementing to the next RV parameter in the sequence until it receives a simulated ACK response. When the software encounters an ACK response, the RV sequence resets to the first RV parameter.

***RST** 0

Range 0–7

Remarks To use this command's parameter in a setup, you must also set HARQ as the feedback selection. Refer to the ":DLINk:HSDPa:FCONtrol" on page 700 for selecting the feedback type.

Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:HSDPa[1]|2|3|4:BSINfo

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:BSINfo <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:BSINfo?
```

This command sets the HS-DSCH block size. HSDPA1 is the only HSDPA channel configuration that supports the HS-DSCH; however, the block size information parameter is also available for HSDPA2–4 for HS-SCCH coding purposes.

***RST** 36

Range 0–63

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:HSDPa[1]|2|3|4:HSPDsch:COFFset

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDsch:
COFFset <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDsch:COFFset?
```

This command sets the HS-PDSCH code offset. The code offset is used in determining the HS-PDSCH channel code.

***RST** HSDPA1: 4 HSDPA2: 8 HSDPA3: 9 HSDPA4: 10

Range 1–16

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

Set all physical channel codes orthogonal to each other. For any channel codes that fail this criteria, the apply function (downlink apply command) will not work.

:DLINk:HSDPa[1]|2|3|4:HSPDsch:DATA

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDsch:DATA
PN9|FIX4|"<file name>"|DSCH
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDsch:DATA?
```

This command configures the HS-PDSCH data type.

DSCH	This choice is the HS-DSCH selection that is supported on only HSDPA1. Selecting the DSCH choice for HSDPA2–4 will generate an error.
"<file name>"	This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (downlink apply command) will not work. Refer to “File Overview” on page 674 for more information on files.
***RST**	PN9
Remarks	Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:HSDPa[1]|2|3|4:HSPDSch:DATA:FIX4

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDSch:DATA:
FIX4 <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDSch:DATA:
FIX4?
```

This command sets the HS-PDSCH repeating 4-bit binary data pattern.

The variable <val> accepts values in binary, hexadecimal, or decimal format, however the query returns only binary values.

***RST**	0
Range	0–15
Remarks	Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:HSDPa:HSPDsch:DSCH:DATA

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:HSPDsch:DSCH:DATA
PN9|FIX4|"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:HSPDsch:DSCH:DATA?
```

This command defines the HS-DSCH data type for HSDPA1. The HS-DSCH is not supported on HSDPA2–4.

"<file name>" This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (downlink apply command) will not work. Refer to “File Overview” on page 674 for more information on files.

***RST** PN9

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:HSDPa:HSPDSch:DSCH:DATA:FIX4

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:HSPDSch:DSCH:DATA:
FIX4 <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:HSPDSch:DSCH:DATA:FIX4?
```

This command defines the HS-DSCH repeating 4-bit binary data pattern for HSDPA1. The HS-DSCH is not supported on HSDPA2–4.

The variable <val> accepts values in binary, hexadecimal, or decimal format, however the query returns only binary values.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:HSDPa:HSPDSch:DSCH:IRBSize

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:HSPDSch:DSCH:IRBSize <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:HSPDSch:DSCH:IRBSize?
```

This command sets the HS-DSCH IR buffer size per the HARQ process for HSDPA1. The HS-DSCH is not supported on HSDPA2–4.

***RST** 9600

Range 960–28800

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:HSDPa:HSPDsch:NCODe

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:HSPDsch:NCODe <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:HSPDsch:NCODe?
```

This command sets number of codes for the HS-PDSCH on HSDPA1. HSDPA2–4 do not support multicodes.

***RST** 1

Range 1–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

Set all physical channel codes so they are orthogonal to each other. If any of the channel codes fail to meet this criteria, the apply function (downlink apply command) will not work.

:DLINk:HSDPa[1]|2|3|4:HSPDsch:POWer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDsch:
POWer <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDsch:POWer?
```

This command sets the HS-PDSCH power level.

The variable <val> is expressed in decibels (dB).

***RST**	–1.02000000E+001
Range	–40 to 0
Remarks	Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:HSDPa[1]|2|3|4:HSPDsch:SFORmat

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDsch:SFORmat
0|1
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDsch:SFORmat?
```

This command sets the HS-PDSCH slot format.

0	This sets the modulation type to QPSK.
1	This sets the modulation type to 16QAM.
***RST**	1
Remarks	Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:HSDPa[1]|2|3|4:HSPDsch[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDsch[:STATe]
ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDsch[:STATe]?
```

This command turns the selected HS-PDSCH on or off.

***RST**	HSDPA1: 1 HSDPA2–4: 0
Remarks	Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677. The HS-PDSCH turns on only when the HS-SCCH is on. Turning off the HS-SCCH also turns off the active HS-PDSCH. To turn the HS-SCCH on or off, see “:DLINk:HSDPa[1]|2|3|4[:STATe]” on page 712.

:DLINk:HSDPa[1]|2|3|4:HSSCch:CCODe

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:HSSCch:CCODe <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:HSSCch:CCODe?
```

This command sets the HS-SCCH channel code.

***RST** HSDPA1: 4 HSDPA2: 5 HSDPA3: 6 HSDPA4: 7

Range 1–127

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

Set all physical channel codes so they are orthogonal to each other. If any of the channel codes fail to meet this criteria, the apply function (downlink apply command) will not work.

:DLINk:HSDPa[1]|2|3|4:HSSCch:DATA

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:HSSCch:DATA
PN9|FIX4|"<file name>"|STD
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:HSSCch:DATA?
```

This command sets the data type for the selected downlink HS-SCCH.

STD This choice configures the bit field as defined by the 3GPP standards.

"<file name>" This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (downlink apply command) will not work. Refer to "File Overview" on page 674 for more information on files.

***RST** STD

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:HSDPa[1]|2|3|4:HSSCch:DATA:FIX4

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:HSSCch:DATA:
FIX4 <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:HSSCch:DATA:FIX4?
```

This command sets the HS-SCCH repeating 4-bit binary data pattern.

The variable <val> accepts values in binary, hexadecimal, or decimal format; however, the query returns only binary values.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:HSDPa[1]|2|3|4:HSSCch:POWer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:HSSCch:
POWer <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:HSSCch:POWer?
```

This command sets the HS-SCCH power level.

The variable <val> is expressed in decibels (dB).

***RST** –1.02000000E+001

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:HSDPa[1]|2|3|4:ITTI

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:ITTI <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:ITTI?
```

This command sets the static inter-TTI pattern value for the selected HSDPA.

The variable <val> is expressed in subframes (one subframe = 2 ms).

***RST** 8

Range 1–16

Remarks To use a static pattern, select FIX as the choice for the :DLINk:HSDPa[1]|2|3|4:ITTI:PATTern command.

Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:HSDPa[1]|2|3|4:ITTI:PATTern

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:ITTI:PATTern
FIX|"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:ITTI:PATTern?
```

This command selects which method sets the inter-TTI pattern for the selected HSDPA.

FIX This choice enables a static pattern. To configure the pattern, see ":DLINk:HSDPa[1]|2|3|4:ITTI".

"<file name>" This variable represents an inter-TTI pattern file stored in signal generator memory. Creating and using a file provides the option of having a flexible inter-TTI pattern where you can vary the distance between HS-PDSCH transmissions. To create a file, use one or a combination of the following methods:

- To create a file internal to the software, use the inter-TTI user pattern editor.
- To create a file external to the software, use a text editor.

  For more information, see the Signal Studio for 3GPP W-CDMA HSPA software online help.

The file name follows the form <project name>–ITTIx, where 'x' is the HSDPA number from one to four. The inter-TTI pattern must contain at least one bit, or the apply function (downlink apply command) will not work.

***RST** FIX

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:HSDPa:NHPRocess

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:NHPRocess <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa:NHPRocess?
```

This command sets the HS-DSCH number of HARQ processes for HSDPA1. For HSDPA2–4, this parameter is fixed at one and is used only for HS-SCCH coding purposes.

***RST** 4

Range 1–8

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:HSDPa[1]|2|3|4:RVParameter

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:RVParameter <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:RVParameter?
```

This command sets the HS-DSCH RV parameter. For HSDPA2–4, which do not support an HS-DSCH, this parameter is used only for HS-SCCH coding purposes.

***RST** 0

Range 0–7

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:HSDPa[1]|2|3|4:UEID

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:UEID <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4:UEID?
```

This command sets the UEID.

***RST** HSDPA1: 0 HSDPA2: 1 HSDPA3: 2 HSDPA4: 3

Range 0–65535

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:HSDPa[1]|2|3|4[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4[:STATe] ON|OFF|
1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:HSDPa[1]|2|3|4[:STATe]?
```

This command turns the selected downlink HSDPA channel on or off.

ON (1)	• Turns on the HS-SCCH for the selected HSDPA. • Enables turning on the HS-PDSCH for the selected HSDPA.
OFF (0)	• Turns off the HS-SCCH for the selected HSDPA. • Turns off the active HS-PDSCH for the selected HSDPA.

***RST** HSDPA1: 1 HSDPA2–4: 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

Refer to ":DLINk:HSDPa[1]|2|3|4:HSPDsch[:STATe]" on page 707 for turning the HS-PDSCH on or off.

An HSDPA consists of a HS-SCCH and a HS-PDSCH; the HS-DSCH is supported on only HSDPA1.

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:CCODe

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16:CCODe <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16:CCODe?
```

This command sets the channel code for the selected downlink OCNS.

***RST**	OCNS1: 2	OCNS2: 3	OCNS3: 4	OCNS4: 5
	OCNS5: 6	OCNS6: 7	OCNS7: 8	OCNS8: 9
	OCNS9: 10	OCNS10: 11	OCNS11: 12	OCNS12: 13
	OCNS13: 14	OCNS14: 15	OCNS15: 16	OCNS16: 17

Range 1–127

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:DATA

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16:DATA PN9|PN15
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16:DATA?
```

This command configures the data pattern for the selected downlink OCNS.

***RST** PN9

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:MODulation

Supported E4438C with Option 419

[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:
MODulation<val>

[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:
MODulation?

This command sets the modulation for the selected downlink OCNS.

***RST** QPSK

Range QPSK | QAM16

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:POWer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16:POWer <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16:POWer?
```

This command sets the power level for the selected downlink OCNS.

The variable <val> is expressed in units of dB.

***RST**	OCNS1: –6	OCNS2: –8	OCNS3: –8	OCNS4: –10
	OCNS5: –7	OCNS6: –9	OCNS7–16: –10	

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:SF

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|
13|14|15|16:SF<val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|
13|14|15|16:SF?
```

This command sets the spreading factor for the selected downlink OCNS.

***RST** 128

Range 16 | 128

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:SSCoffset

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16:SSCoffset <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16:SSCoffset?
```

This command sets the secondary scrambling code offset for the selected downlink OCNS.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:TOFFset

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16:TOFFset <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16:TOFFset?
```

This command adjusts the timing offset for the OCNS.

***RST**	OCNS1: 1	OCNS2: 2	OCNS3: 3	OCNS4: 4
	OCNS5: 5	OCNS6: 6	OCNS7: 7	OCNS8: 8
	OCNS9: 9	OCNS10: 10	OCNS11: 11	OCNS12: 12
	OCNS13: 13	OCNS14: 14	OCNS15: 15	OCNS16: 16

Range 0–149

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16[:STATe]?
```

This command turns the selected OCNS on or off.

***RST** 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:PCCPch:BCH:DATA

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PCCPch:BCH:DATA PN9|PN15|FIX4|
"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PCCPch:BCH:DATA?
```

This command sets the BCH data format that is transmitted on the P-CCPCH.

"<file name>" This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (downlink apply command) will not work. Refer to "File Overview" on page 674 for more information on files.

***RST** FIX4

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:PCCPch:BCH:DATA:FIX4

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PCCPch:BCH:DATA:FIX4 <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PCCPch:BCH:DATA:FIX4?
```

This command sets the BCH repeating 4-bit binary data pattern.

The variable <val> accepts values in binary, hexadecimal, or decimal format; however, the query returns only binary values.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:PCCPch:CCODe

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PCCPch:CCODe <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PCCPch:CCODe?
```

This command sets the P-CCPCH channel code.

***RST** +1

Range 0–255

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

Set all physical channel codes so they are orthogonal to each other. If any of the channel codes fail to meet this criteria, the apply function (downlink apply command) will not work.

:DLINk:PCCPch:POWer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PCCPch:POWer <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PCCPch:POWer?
```

This command sets the P-CCPCH power level.

The variable <val> is expressed in decibels (dB).

***RST** –5.30000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:PCCPch[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PCCPch[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PCCPch[:STATe]?
```

This command turns the P-CCPCH on or off.

***RST** 1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:PICH:CCODe

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PICH:CCODe <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PICH:CCODe?
```

This command sets the PICH channelization code.

***RST** +3

Range 0–255

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

Set all physical channel codes so they are orthogonal to each other. If any of the channel codes fail to meet this criteria, the downlink apply command will not work.

:DLINk:PICH:DATA

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PICH:DATA PN9|PN15|FIX4|
"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PICH:DATA?
```

This command sets the PICH data type.

"<file name>" This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (downlink apply command) will not work. Refer to "File Overview" on page 674 for more information on files.

***RST** PN9

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:PICH:DATA:FIX4

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PICH:DATA:FIX4 <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PICH:DATA:FIX4?
```

This command sets the PICH repeating 4-bit binary data pattern.

The variable <val> accepts values in binary, hexadecimal, or decimal format; however, the query returns only binary values.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:PICH:POWer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PICH:POWer <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PICH:POWer?
```

This command sets the PICH power level.

The variable <val> is expressed in decibels (dB).

***RST** –8.300000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:PICH[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PICH[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PICH[:STATe]?
```

This command turns the PICH on or off.

***RST** 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:POLarity

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:POLarity NORMal|INVerted|INVert
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:POLarity?
```

This command selects the phase polarity of the downlink signal.

NORMal This choice selects normal polarity.

INVerted, INVert These choices perform the same function, inverting the internal Q signal.

***RST** NORM

Remarks Setting the command parameter while the signal is active also requires executing the apply command. For more information, refer to ":DLINk:APPLy" on page 677.

:DLINk:PSCH:POWer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PSCH:POWer <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PSCH:POWer?
```

This command sets the PSCH power level.

The variable <val> is expressed in decibels (dB).

***RST** –8.30000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:PSCH[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PSCH[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:PSCH[:STATe]?
```

This command turns the PSCH on or off.

***RST** 1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. For more information, refer to ":DLINk:APPLy" on page 677.

:DLINk:SCRamblecode

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:SCRamblecode <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:SCRamblecode?
```

This command sets the downlink scramble code number.

***RST** +0

Range 0–511

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:SSCH:POWer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:SSCH:POWer <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:SSCH:POWer?
```

This command sets the SSCH power level. The variable <val> is expressed in decibels (dB)

***RST** –8.30000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 677.

:DLINk:SSCH[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:SSCH[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:SSCH[:STATe]?
```

This command turns the SSCH on or off.

***RST** 1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:DLINk:TXDiversity

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:TXDiversity NONE|OANT1|OANT2
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:DLINk:TXDiversity?
```

This command selects the downlink signal transmit diversity mode.

NONE This choice disables the transmit diversity mode.

OANT1 This choice selects the transmit diversity openloop antenna 1 mode.

OANT2 This choice selects the transmit diversity openloop antenna 2 mode.

***RST** NONE

Remarks To configure both antennas (one and two) requires two ESGs.

Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 677.

:LINK

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:LINK DOWN|UP
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:LINK?
```

This command sets the uplink or downlink mode.

***RST** UP

:ULINk:APPLy

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:APPLy
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:APPLy?
```

This command applies changes to the channel setup and data for active physical and transport channels, immediately starting the channel coding generation process. A progress bar may appear on the ESG display indicating that the new signal parameters are being applied. Turning on the HSPA modulation format also applies the signal parameters.

The query response determines whether or not there is a need to execute the command. It returns the following responses:

0 Command execution is not required.

1 Command execution is required.

NOTE The query response is only valid while the HSPA format is active.

When there is a setting conflict (ESG reports an error) with the range values or coupled parameters, or both, executing the uplink apply command does not apply the new changes until the conflicts are resolved. After resolving the setting conflicts, execute the command to apply the new settings.

:ULINk:AWGN:CN

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:AWGN:CN <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:AWGN:CN?
```

This command sets the uplink in-band carrier to noise ratio (C/N) value using AWGN.

***RST** 0 dB

Range –30 to 30 dB

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to :ULINk:APPLy”.

:ULINk:AWGN[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:AWGN[:STATe] ON|OFF|0|1
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:AWGN[:STATe]?
```

This command turns the uplink AWGN on or off.

***RST** 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:BBReference:EXTernal:MRATe

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:BBReference:EXTernal:MRATe
X1|X2|X4
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:BBReference:EXTernal:MRATe?
```

This command configures the ESG, so it can accept an external baseband generator clock that is a multiple of the internal 3.84 MHz chip clock.

X1 This sets the ESG to accept an external clock rate identical to the chip clock.

X2 This sets the ESG to accept an external clock rate that is two times the rate of the chip clock.

X4 This sets the ESG to accept an external clock rate that is four times the rate of the chip clock.

***RST** X1

:ULINk:BBReference:EXTernal[:SOURce]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:BBReference[:SOURce]{INTernal}|
EXTernal
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:BBReference?
```

This command selects the baseband generator reference source for the radio uplink channel.

***RST** INT

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:CRATe

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:CRATe <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:CRATe?
```

This command sets the chip rate (in units of samples).

***RST** 3.840000 Mcps

Range .24000 - 4.224 Mcps

:ULINk:DPCCh:CCODe

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPCCh:CCODe?
```

This query returns the channelization code for the uplink DPCCH. The slot format determines the channelization code in accordance with the 3GPP standards.

:ULINk:DPCCh:DATA

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPCCh:DATA PN9|PN15|FIX4|STD|
"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPCCh:DATA?
```

This command configures the uplink DPCCH data pattern.

STD This sets the DPCCH bit fields according to the 3GPP standards.

"<file name>" This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (uplink apply command) will not work. Refer to “File Overview” on page 674 for more information on files.

***RST** STD

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 723.

:ULINk:DPCCh:DATA:FIX4

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPCCh:DATA:FIX4 <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPCCh:DATA:FIX4?
```

This command sets the uplink DPCCH repeating 4-bit binary data pattern.

The variable <val> accepts values in binary, hexadecimal, or decimal format; however, the query returns only binary values.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 723.

:ULINk:DPCCh:FBI:PATTern

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPCCh:FBI:PATTern PN9|PN15|FIX|
"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPCCh:FBI:PATTern?
```

This command configures the uplink DPCCH FBI pattern.

"<file name>" This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (uplink apply command) will not work. Refer to “File Overview” on page 674 for more information on files.

***RST** FIX

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 723.

:ULINk:DPCCh:FBI:PATTern:FIX

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPCCh:FBI:PATTern:FIX <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPCCh:FBI:PATTern:FIX?
```

This command sets the 30-bit FBI pattern for the uplink DPCCH.

The variable <val> accepts values in binary, hexadecimal, or decimal format; however, the query returns only binary values.

***RST** +0

Range 0–1073741823

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:DPCCh:POWer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPCCh:POWer <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPCCh:POWer?
```

This command sets the uplink DPCCH power level.

The variable <val> is expressed in decibels (dB)

***RST** –2.69000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:DPCCh:SFORmat

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPCCh:SFORmat <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPCCh:SFORmat?
```

This command sets the uplink DPCCH slot format.

***RST** +0

Range 0–5

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

The slot format determines the settings for other parameters in accordance with 3GPP standards.

:ULINk:DPCCh:TFCI

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPCCh:TFCI <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPCCh:TFCI?
```

This command sets the uplink DPCCH TFCI 10-bit data pattern.

The variable <val> accepts values in binary, hexadecimal, or decimal format; however, the query returns only decimal values.

***RST** +0

Range 0–1023

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:DPCCh:TPC:NSTeps

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPCCh:TPC:NSTeps <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPCCh:TPC:NSTeps?
```

This command sets the number of steps for the down and up (DUP) or up and down (UDOWn) TPC pattern selections.

The variable <val> is expressed in decibels (dB).

***RST** +1

Range 1–80

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:DPCCh:TPC:PATTern

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPCCh:TPC:PATTern
UDOWn|DUP|UALL|DALL|"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPCCh:TPC:PATTern?
```

This command configures the uplink DPCCH TPC pattern for increasing or decreasing, or increasing and decreasing the BTS power level.

UDOWn	The TPC pattern repetitively steps up and down.
DUP	The TPC pattern repetitively steps down and up.
UALL	The TPC pattern consecutively steps up.
DALL	The TPC pattern consecutively steps down.
"<file name>"	This variable represents a power pattern file stored in signal generator memory. The pattern must contain at least one bit or the apply function (downlink apply command) will not work. Refer to “File Overview” on page 674 for more information on files.

***RST** UDOW

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 723.

Each step in a TPC pattern signals an increase or decrease of 1 dB in the BTS output power level.

:ULINk:DPCCh[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPCCh[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPCCh[:STATe]?
```

This command turns the uplink DPCCH on or off.

***RST** 1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 723.

:ULINk:DPDCh:CCODe

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:CCODe?
```

This query returns the uplink DPDCH channelization code.

The slot format determines the channelization code in accordance with the 3GPP standards. See “:ULINk:DPDCh:SFORmat” on page 735 for setting the slot format.

:ULINk:DPDCh:DATA

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DATA PN9|PN15|FIX4|DCH|
"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DATA?
```

This command configures the uplink DPDCH data pattern.

DCH This choice selects the transport channel as the data source.

"<file name>" This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (uplink apply command) will not work. Refer to “File Overview” on page 674 for more information on files.

***RST** PN9

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 723.

:ULINk:DPDCh:DATA:FIX4

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DATA:FIX4 <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DATA:FIX4?
```

This command sets the uplink DPDCH repeating 4-bit binary data pattern.

The variable <val> accepts values in binary, hexadecimal, or decimal format; however, the query returns only binary values.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 723.

:ULINk:DPDCh:DCH[1]|2|3|4|5|6:BSIZe

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:
BSIZe <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:BSIZe?
```

This command sets the block size for the selected uplink DCH.

***RST** 20

Range 0–5000

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

The number of data bits per DCH cannot exceed 200,000. To maintain this data bit limit, the ESG calculates the product of the block size and the number of blocks. If the product of these two parameters exceeds 200,000, the apply function (uplink apply command) will not work.

:ULINk:DPDCh:DCH[1]|2|3|4|5|6:CRC

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:CRC
0|8|12|16|24
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:CRC?
```

This command sets the number of CRC bits for the selected uplink DCH.

***RST** 8

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:DPDCh:DCH[1]|2|3|4|5|6:CTYPe

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:CTYPe
HCONv|TCONv|TURBo|NONE
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:CTYPe?
```

This command selects the encoder type for the selected uplink DCH.

HCONv This choice selects the 1/2 rate convolutional encoder.

TCONv This choice selects the 1/3 rate convolutional encoder.

TURBo This choice selects the turbo coder.

NONE This choice selects no coding.

***RST** HCON

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:DPDCh:DCH[1]|2|3|4|5|6:DATA

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:DATA PN9|
PN15|FIX4|"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:DATA?
```

This command configures the data for the selected uplink DCH.

"<file name>" This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (uplink apply command) will not work. Refer to "File Overview" on page 674 for more information on files.

***RST** PN9

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:DPDCh:DCH[1]|2|3|4|5|6:DATA:FIX4

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:DATA
:FIX4 <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:DATA
:FIX4?
```

This command sets the repeating 4-bit binary data pattern for the selected uplink DCH.

The variable <val> accepts values in binary, hexadecimal, or decimal format; however, the query returns only binary values.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:DPDCh:DCH[1]|2|3|4|5|6:NBLocks

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:NBLocks
<val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:NBLocks?
```

This command sets the number of blocks for the selected uplink DCH.

***RST** 1

Range 0–512

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

The number of data bits per DCH cannot exceed 200,000. To maintain this data bit limit, the block size is multiplied by the number of blocks. If the product of these two parameters exceeds 200,000, the uplink apply command will not work.

:ULINk:DPDCh:DCH[1]|2|3|4|5|6:RMATtribute

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:
RMATtribute <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:
RMATtribute?
```

This command sets the rate matching attribute for the selected uplink DCH.

***RST** 1

Range 1–256

Remarks Setting the command parameter while the signal is active also requires executing the apply command. For more information, refer to ":ULINk:APPLy" on page 723.

:ULINk:DPDCh:DCH[1]|2|3|4|5|6:TTI

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:TTI
10|20|40|80
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:TTI?
```

This command sets the TTI for the selected uplink DCH.

The choices are expressed in millisecond (ms).

***RST** 10

Remarks Setting the command parameter while the signal is active also requires executing the apply command. For more information, refer to ":ULINk:APPLy" on page 723.

:ULINk:DPDCh:DCH2|3|4|5|6[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DCH2|3|4|5|6[:STATe]
ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:DCH2|3|4|5|6[:STATe]?
```

This command turns the selected uplink DCH on or off; DCH1 is always on.

***RST** DCH 1: 1 DCH 2– *6*: 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 723.

The apply command will not work and the ESG will report an error if you turn on a DCH where lower numbered DCHs are off. For example, turning on DCH5 requires turning on DCH2–4. The reverse is true when turning off the DCHs.

:ULINk:DPDCh:POWer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:POWer <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:POWer?
```

This command sets the uplink DPDCH power level.

The variable <val> is expressed in decibels (dB).

***RST** +0.00000000E+00

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 723.

:ULINk:DPDCh:SFORmat

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:SFORmat <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh:SFORmat?
```

This command sets the uplink DPDCH slot format.

***RST** +2

Range 0– 6

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 723.

The slot format determines the settings for other parameters in accordance with the 3GPP standards.

:ULINk:DPDCh[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:DPDCh[:STATe]?
```

This command turns the uplink DPDCH on or off.

***RST** 1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:FCLock:INTerval

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:FCLock:INTerval 10|20|40|80|2560
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:FCLock:INTerval?
```

This command selects the frame clock interval for the synchronization signal.

The frame clock interval is set in milliseconds (ms).

***RST** 80

Remarks Ensure that the selected interval is equal to or longer than the longest transport channel TTI period.

This command is applicable only when FCLock is the sync source selection. See ":ULINk:SYNC[:SOURce]" on page 761 for selecting the sync source.

:ULINk:FCLock:POLarity

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:FCLock:POLarity POSitive|
NEGative
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:FCLock:POLarity?
```

This command sets the frame clock polarity.

POSitive This choice sets the clock gate to trigger when the signal is high.

NEGative This choice sets the clock gate to trigger when the signal is low.

***RST** POS

Remarks This command is applicable only when FCLock is the sync source selection. See ":ULINk:SYNC[:SOURce]" on page 761 for selecting the sync source.

:ULINk:FILTer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:FILTer RNYQuist|NYQuist|
GAUSsian|RECTangle|IS95|IS95_EQ|IS95_MOD|IS95_MOD_EQ|AC4Fm|UGGaussian|
"<user FIR>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:FILTer?
```

This command selects the uplink filter type.

IS95 This filter meets the criteria of the IS-95 standard.

IS95_EQ This filter is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard and is best suited for IS-95 baseband filtering.

IS95_MOD This filter meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.

IS95_MOD_EQ This filter is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance), with lower passband rejection.

UGGaussian This is a GSM Gaussian filter with a fixed BbT value of 0.300.

AC4Fm This is a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.

"<user FIR>" This variable represents any FIR filter file stored in signal generator memory. Refer to “File Overview” on page 674 for more information on files.

***RST** RNYQ

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 857.

:ULINk:FILTer:ALPHa

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:FILTer:ALPHa <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:FILTer:ALPHa?
```

This command sets the uplink Nyquist or root Nyquist filter alpha value.

***RST** +2.20000000E–001

Range 0–1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Executing this command while a filter other than Nyquist or

root Nyquist is selected changes the parameter value, but it is not used by the signal generator until one of the Nyquist filters is selected. Refer to ":ULINk:APPLy" on page 723.

:ULINk:FILTer:BBT

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:FILTer:BBT <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:FILTer:BBT?
```

This command sets the uplink Gaussian filter BbT value.

***RST** +5.00000000E–001

Range 0–1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

Executing this command while a filter other than the Gaussian filter is selected changes the parameter value, but it is not used by the signal generator until the Gaussian filter is selected.

:ULINk:FILTer:CHANnel

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:FILTer:CHANnel EVM|ACP
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:FILTer:CHANnel?
```

This command optimizes an uplink filter for minimized EVM or for minimized ACP.

EVM This choice provides the most ideal passband.

ACP This choice improves stopband rejection for the root Nyquist and Nyquist filters.

***RST** EVM

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

To change the filter selection, refer to ":ULINk:FILTer" on page 737.

:ULINk:FOFFset

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:FOFFset <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:FOFFset?
```

This command sets the CFN starting frame within the SFN by setting a frame offset relative to SFN zero.

***RST** 0

Range 0–255

Remarks The command adds delays to the internal frame counter by specifying the starting frame number count. When the frame offset (FOFFset) is set to 0, the frame number starts at the system sync trigger. When the FOFFset is set to 2, the signal generator triggers two frames after the SFN RST. For additional information, refer to 3GPP TS25.402 for SFN and CFN relationship.

:ULINk:HCONfig

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HCONfig 0|1
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HCONfig?
```

This command sets HS-DSCH to be configured.

***RST** 1

:ULINk:HSDPcch:APATtern

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSDPcch:APATtern NONE|ACK_ALL|
"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSDPcch:APATtern?
```

This command sets the HS-DPCCH ACK/NACK transmission pattern for each of the 1280 subframes that make up the pattern.

NONE — This choice sets all subframes to DTX.

"<file name>" — This variable represents an ACK pattern file stored in signal generator memory. The file must contain 2,560-bits of data (2-bits per subframe) or the apply function (uplink apply command) will not work.

- An ACK response is represented by 00.
- A NACK response is represented by 01.
- DTX is represented by 10.

Enter the 2,560-bits into the file as a binary string.

Refer to “File Overview” on page 674 for more information on files.

***RST** ACK_ALL

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 723.

:ULINk:HSDPcch:APOWer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSDPcch:APOWer <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSDPcch:APOWer?
```

This command sets the HS-DPCCH ACK part power level.

The variable <val> is expressed in decibels (dB).

***RST** –2.69000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 723.

:ULINk:HSDPcch:CCODe

Supported E4438C with Option 419

```
[:SOURce]RADio:WCDMa:HSPA[:BBG]:ULINk:HSDPcch:CCODe?
```

This query returns the HS-DPCCH channelization code.

:ULINk:HSDPcch:CPATtern

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSDPcch:CPATtern NONE|
"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSDPcch:CPATtern?
```

This command sets the HS-DPCCH CQI transmission pattern for each of the 1280 subframes that make up the pattern.

NONE This choice sets all subframes to DTX.

"<file name>" This variable represents a bit file stored in signal generator memory. The file must contain 10,240-bits of data (8-bits per subframe) or the apply function (uplink apply command) will not work.

- A CQI response range is one to thirty using 8-bits, 00000001 to 00011110.
- DTX is represented by 11111111.

Enter the 10,240-bits into the file as a binary string.

Refer to “File Overview” on page 674 for more information on files.

***RST** NONE

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 723.

:ULINk:HSDPcch:CPOWer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSDPcch:CPOWer <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSDPcch:CPOWer?
```

This command sets the HS-DPCCH CQI part power level.

The variable <val> is expressed in decibels (dB).

***RST** –2.69000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 723.

:ULINk:HSDPcch:NPOWer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSDPcch:NPOWer <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSDPcch:NPOWer?
```

This command sets the HS-DPCCH NACK part power level. The variable <val> is expressed in decibels (dB).

***RST** –2.69000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:HSDPcch:SFDelay

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSDPcch:SFDelay <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSDPcch:SFDelay?
```

This command sets the HS-DPCCH subframe delay. The variable <val> is expressed in units of 256 chips.

***RST** 0

Range 0–150

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:HSDPcch[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSDPcch[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSDPcch[:STATe]?
```

This command turns the HS-DPCCH on or off.

***RST** 1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:HSUPa:EDPCch:DATA

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPCch:DATA
PN9|FIX4|STD|"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPCch:DATA?
```

This command sets the data type for the selected downlink E-DPCCH.

STD This choice configures the bit field as defined by the 3GPP standards.

"<file name>" This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function will not work.

***RST** STD

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:HSUPa:EDPCch:DATA:FIX4

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPCch:DATA:FIX4 <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPCch:DATA:FIX4?
```

This command sets the data type for E-DPCCH repeating 4-bit binary pattern.

The variable <val> accepts values in binary, hexadecimal, or decimal format; however, the query returns only binary values.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:HSUPa:EDPCch:POWer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPCch:POWer <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPCch:POWer?
```

This command sets the E-DPCCH power level. The variable <val> is expressed in decibels (dB).

***RST** –2.69000000E+000

Range –40 to 0 dB

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 857.

:ULINk:HSUPa:EDPCch[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPCch[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPCch[:STATe]?
```

This command turns the E-DPCCH on or off.

***RST** 1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 723.

:ULINk:HSUPa:EDPDch:DATA

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPDch:DATA:
PN9|FIX4|STD|"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPCch:DATA?
```

This command sets the data type for the selected downlink E-DPDCH.

STD This choice configures the bit field as defined by the 3GPP standards.

"<file name>" This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function will not work.

***RST** STD

:ULINk:HSUPa:EDPDch:DATA:FIX4

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPDch:DATA:FIX4 <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPDch:DATA?
```

This command sets the data type for E-DPDCH repeating 4-bit binary pattern.

The variable <val> accepts values in binary, hexadecimal, or decimal format; however, the query returns only binary values.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:HSUPa:EDPDch:EDCH:DATA

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPDch:DATA PN9|FIX4|STD|
"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPDch:DATA?
```

This command defines the E-DCH data type.

"<file name>" This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function will not work.

***RST** PN9

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:HSUPa:EDPDch:EDCH:DATA:FIX4

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPDch:EDCH:DATA:FIX4 <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPDch:EDCH:DATA:FIX4?
```

This command sets the E-DPDCH repeating 4-bit binary data pattern.

The variable <val> accepts values in binary, hexadecimal, or decimal format; however, the query returns only binary values.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:HSUPa:EDPDch:MCCodes

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPDch:MCCodes
SF256|SF128|SF64|SF32|SF16|SF8|SF4|SF4SF4|SF2SF2|SF4SF4SF2SF2
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPDch:MCCodes?
```

This command sets the maximum channelization codes for E-DPDCH.

SF256	Set the spreading factor to 256 and the number of E-DPDCH to 1
SF128	Set the spreading factor to 128 and the number of E-DPDCH to 1
SF64	Set the spreading factor to 64 and the number of E-DPDCH to 1
SF32	Set the spreading factor to 32 and the number of E-DPDCH to 1
SF16	Set the spreading factor to 16 and the number of E-DPDCH to 1
SF8	Set the spreading factor to 8 and the number of E-DPDCH to 1
SF4	Set the spreading factor to 4 and the number of E-DPDCH to 1
SF4SF4	Set the spreading factor to 4 and the number of E-DPDCH to 2
SF2SF2	Set the spreading factor to 2 and the number of E-DPDCH to 2
SF4SF4SF2SF2	Set the spreading factor to 4 for 2 E-DPDCHs and spreading factor to 2 for 2 E-DPDCHs

***RST** SF4SF4SF2SF2

Remarks The maximum channelization codes are used together with the E-DCH configuration, and PL-non-MAX to automatically calculate the physical channel codes according to TS 25.212 (4.8.4.1).

:ULINk:HSUPa:EDPDch:PLNMax

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPDch:PLNMax <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPDch:PLNMax?
```

This command sets the PL non-max value for the E-DPDCH used in the determination of SF and number of E-DPDCHs as defined in TS 25.212 (4.8.4.1) for compressed mode.

***RST** 0.44

Resolution 0.04

Range 0.44 to 1.0

:ULINk:HSUPa:EDPDch:POWer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPDch:POWer <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPCch:POWer?
```

This command sets the E-DPDCH power level. The variable <val> is expressed in decibels (dB).

***RST** +0.00000000E+001

:ULINk:HSUPa:EDPDch:SNPHchs

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPDch:SNPHchs
SF256|SF128|SF64|SF32|SF16|SF8|SF4|SF4SF4|SF2SF2|SF4SF4SF2SF2|AUTO
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPCch:SNPHchs?
```

This command sets the SF and number of E-DPDCHs to configure the physical channel manually. To configure the physical channel as defined in TS 25.212 (4.8.4.1), refer to ":ULINk:HSUPa:EDPDch:MCCodes" on page 746.

SF256	Set the spreading factor to 256 and the number of E-DPDCH to 1
SF128	Set the spreading factor to 128 and the number of E-DPDCH to 1
SF64	Set the spreading factor to 64 and the number of E-DPDCH to 1
SF32	Set the spreading factor to 32 and the number of E-DPDCH to 1
SF16	Set the spreading factor to 16 and the number of E-DPDCH to 1
SF8	Set the spreading factor to 8 and the number of E-DPDCH to 1

SF4	Set the spreading factor to 4 and the number of E-DPDCH to 1
SF4SF4	Set the spreading factor to 4 and the number of E-DPDCH to 2
SF2SF2	Set the spreading factor to 2 and the number of E-DPDCH to 2
SF4SF4SF2SF2	Set the spreading factor to 4 for 2 E-DPDCHs and spreading factor to 2 for 2 E-DPDCHs
AUTO	Calculate the spreading factor and number of codes automatically from maximum channelization codes, PL non-max, E-TFCI table selection, and E-TFCI index as defined in TS 25.212 (4.8.4.1).
***RST**	SF4
Remarks	ULINk:TGAP:PSI[1]:PS can be set ACTive only when the :ULINk:HSUPa:EDPDch:SNPHchs is AUTO.

:ULINk:HSUPa:EDPDch[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPDch[:STATe]
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPCch[:STATe]?
```

This command turns the E-DPDCH on or off.

***RST** 1

:ULINk:HSUPa:ETABle

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPDch:ETABle 0|1
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:EDPCch:ETABle?
```

This command selects the E-TFCI tables as specified in E-TFCI Table Selection, TS 25.321 Annex B.

***RST** 1

:ULINk:HSUPa:ETFCi

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:ETFCi <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:ETFCi?
```

This command sets the E-TFC index 7-bit pattern.

***RST** 41

Range 0–127 if E-TFCI Table = 0 and TTI = 2 ms

0–125 if E-TFCI Table = 1 and TTI = 2 ms

0–127 if E-TFCI Table = 0 and TTI = 10 ms

0–120 if E-TFCI Table = 1 and TTI = 10 ms

:ULINk:HSUPa:HARQ:APATtern

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:HARQ:APATtern
ACK_ALL|EXTernal|"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:HARQ:APATtern?
```

This command sets a simulated Node B ACK/NACK pattern that determines HSUPA's HARQ response.

ACK_ALL This choice configures 1,280 subframes (if TTI=2ms) or 1,280 frames (if TTI=10ms) for a simulated ACK only response. For a long transmission, up to 18000 (sub)frames can be configured.

“<file name>” This variable represents an ACK pattern file stored in signal generator memory. Create this file either by using the HARQ ACK/NACK pattern Data Type Entry window and download the file to the ESG, or by using the ESG Real Time W-CDMA table editor to create a bit file with the following bit patterns:

- An ACK response is represented by 0.
- A NACK response is represented by 1.

In the file, do not use delimiters between (sub)frames; enter (sub)frame bits as a binary string. When creating a pattern, you can determine the number of active (sub)frames from 1 to 1,280. The (sub)frames are numbered 0 to 1,279.

External This choice selects specifies an external ACK/NACK pattern.

***RST** ACK_ALL

:ULINk:HSUPa:HARQ:APATtern[:EXTernal]:DELay

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:HARQ:APATtern[:EXTernal]:
DELay <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:HARQ:APATtern[:EXTernal]:
DELay?
```

This command sets the amount of time between the head of a transmitted process and the sampling point of the external ACK/NACK signal corresponding with the process.

The variable <val> is expressed in chips with a resolution of 256.

***RST** 7680

:ULINk:HSUPa:HARQ:APATtern[:EXTernal]:INPut

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:HARQ:APATtern[:EXTernal]:
INPut ALTP|BGAT|PTR2
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:HARQ:APATtern[:EXTernal]:
INPut?
```

This command sets the amount of time between the head of a transmitted process and the sampling point of the external ACK/NACK signal corresponding with the process.

The variable <val> is expressed in chips with a resolution of 256.

ALTP This choice sets the input port of the external signal to ALT PWR IN.

BGAT This choice sets the input port of the external signal to BURST GATE IN.

PTR2 This choice sets the input port of the external signal to PATT TRIG IN 2.

***RST** BGAT

:ULINk:HSUPa:HARQ:APATtern[:EXTernal]:POLarity

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:HARQ:APATtern[:EXTernal]:
POLarity POSitive|NEGative
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:HARQ:APATtern[:EXTernal]:
POLarity?
```

This command sets the ACK/NACK signal polarity.

POSitive This choice sets the pattern signal to ACK when the external signal is low and NACK when the external signal is high.

NEGative This choice sets the pattern signal to ACK when the external signal is high and NACK when the external signal is low.

***RST** POS

:ULINk:HSUPa:HARQ:MNRTrans

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:HARQ:MNRTrans <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:HARQ:MNRTrans?
```

This command sets the maximum number of retransmissions.

Range 0–15

***RST** 15

:ULINk:HSUPa:HARQ[:MODE]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:HARQ[:MODE]NONE|
IREDundancy|CCOMbining
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:HARQ[:MODE]?
```

This command sets the HARQ mode to use None, Incremental Redundancy, or Chase Combining for retransmission.

Incr Redundancy This choice sends different coded bits instead of the same coded packets, when a NACK is received.

Chase Combining This choice provides UE feedback by sending the same coded packet again upon reception of a NACK signal.

***RST** NONE

:ULINk:HSUPa:HARQ:HBIT

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:HARQ:HBIT
HAPPy|NHAPpy|"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:HARQ:HBIT?
```

This command sets the HSUPA happy bit.

HAPPy This choice sets the happy bit to happy.

NHAPpy This choice sets the happy bit to not happy.

“<file name>” This variable represents a happy bit pattern file stored in signal generator memory. Create this file either by using the Happy Bit Pattern Data Type Entry window and download the file to the ESG, or by using the ESG Real Time W-CDMA table editor to create a bit file with the following bit patterns:

- A not happy response is represented by 0.
- A happy response is represented by 1.

***RST** HAPPy

:ULINk:HSUPa:HPRocess

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:HPRocess[0]|1||2|3|4|5|6|7
[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:HPRocess[0]1||2|3|4|5|6|7
[:STATe]?
```

This command turns the uplink HSUPA Hybrid ARQ Process on or off for the selected

HARQ process.

1|ON TX the process #n

2|OFF DTX the process #n

***RST** 1

:ULINk:HSUPa:RSN

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:RSN 0|1|2|3
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:RSN?
```

This command sets the HSUPA retransmission sequence number (RSN) when HARQ mode is not selected.

***RST** 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:HSUPa:RVINdex

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:RVINdex 0|1|2|3
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:RVINdex?
```

This command sets the RV control when the HARQ mode is not selected.

***RST** 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:HSUPa:TFC:EPATtern[:EXTernal]:DELay

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC:EPATtern[:EXTernal]:
DELay <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC:EPATtern[:EXTernal]:
DELay?
```

This command sets the amount of time between the head of a transmitted process and the sampling point of the external signal corresponding with the E-TFCI pattern control.

<val> The variable <val> is expressed in chips with a resolution of 256.

***RST** 7680

Range	0 to 153344 (for TTI = 10 ms)
	0 to 61184 (for TTI = 2 ms)
Remarks	Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:HSUPa:TFC:EPATtern[:EXTernal]:INPut

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC:EPATtern[:EXTernal]:
INPut ALTP|BGAT|PTR2
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC:EPATtern[:EXTernal]:
INPut?
```

This command selects the input port for the external TFC E-TFCI pattern signal.

ALTP	This choice sets the input port of the external signal to ALT PWR IN.
BGAT	This choice sets the input port of the external signal to BURST GATE IN.
PTR2	This choice sets the input port of the external signal to PATT TRIG IN 2.
***RST**	BGAT
Remarks	Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:HSUPa:TFC:EPATtern[:EXTernal]:POLarity

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC:EPATtern[:EXTernal]:
POLarity POSitive|NEGative
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC:EPATtern[:EXTernal]:
POLarity?
```

This command sets the external E-TFCI pattern control signal polarity.

POSitive	This choice sets the pattern signal to MAIN when the external signal is low and ALT when the external signal is high.
NEGative	This choice sets the pattern signal to MAIN when the external signal is high and ALT when the external signal is low.
***RST**	POS
Remarks	Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:HSUPa:TFC:EPATtern

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC:EPATtern
MAIN|EXTernal|"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC:EPATtern?
```

This command sets the MAIN and ALT TFC pattern to be used.

MAIN_ALL This choice configures all subframes for a simulated MAIN only response.

EXT This choice selects an external signal to control the data pattern.

"<file name>" This variable represents a MAIN/ALT pattern file stored in signal generator memory. Create this file either by using the TFC pattern Data Type Entry window and download the file to the ESG, or by using the ESG Real Time W-CDMA table editor to create a bit file with the following bit patterns:

- A MAIN response is represented by 0.
- An ALT response is represented by 1

In the file, do not use delimiters between (sub)frames; enter (sub)frame bits as a binary string.

***RST** MAIN

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:HSUPa:TFC[:ALT]:EDPCch:POWer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC[:ALT]:EDPCch:
POWer <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC[:ALT]:EDPCch:POWer?
```

This command sets the E-DPCCH power level of the alternate TFC setting.

The variable <val> is expressed in decibels (dB).

***RST** –2.69000000E+000

Range –40 to 0

:ULINk:HSUPa:TFC[:ALT]:EDPDch:EDCH:DATA

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC[:ALT]:EDPDch:EDCH:DATA
PN9|FIX4|"<file name>"
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC[:ALT]:EDPDch:EDCH:DATA?
```

This command defines the alternate E-DCH data type.

EDCH This choice selects E-DCH for data.

"<file name>" This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function will not work.

***RST** PN9

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:HSUPa:TFC[:ALT]:EDPDch:EDCH:DATA:FIX4

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC[:ALT]:EDPDch:EDCH:DATA:
FIX4 <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC[:ALT]:EDPDch:EDCH:DATA:
FIX4?
```

This command defines the E-DCH repeating 4-bit binary data pattern when the alternate TFC setting is used.

The variable <val> accepts values in binary, hexadecimal, or decimal format; however, the query returns only binary values.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:HSUPa:TFC[:ALT]:EDPDch:POWer

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC[:ALT]:EDPDch:
POWer <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC[:ALT]:EDPDch:POWer?
```

This command sets the E-DPDCH power level of the alternate TFC setting.

The variable <val> is expressed in decibels (dB).

***RST** 0.00000000E+00

Range –40 to 0

:ULINk:HSUPa:TFC[:ALT]EDPDch:SNPHchs

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC[:ALT]:EDPDch:SNPHchs
SF256|SF128|SF64|SF32|SF16|SF8|SF4|SF4SF4|SF2SF2|SF4SF4SF2SF2
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC[:ALT]:EDPDch:SNPHchs?
```

This command sets the SF and number of E-DPDCHs of the TFC alternate setting.

SF256	Set the spreading factor to 256 and the number of E-DPDCH to 1
SF128	Set the spreading factor to 128 and the number of E-DPDCH to 1
SF64	Set the spreading factor to 64 and the number of E-DPDCH to 1
SF16	Set the spreading factor to 16 and the number of E-DPDCH to 1
SF8	Set the spreading factor to 8 and the number of E-DPDCH to 1
SF4	Set the spreading factor to 4 and the number of E-DPDCH to 1
SF4SF4	Set the spreading factor to 4 and the number of E-DPDCH to 2
SF2SF2	Set the spreading factor to 2 and the number of E-DPDCH to 2
SF4SF4SF2SF2	Set the spreading factor to 4 for 2 E-DPDCHs and the spreading factor to 2 for 2 E-DPDCHs

***RST** SF4

:ULINk:HSUPa:TFC[:ALT]:ETABle

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC[:ALT]:ETABle 0|1
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC[:ALT]:ETABle?
```

This command sets the E-TFCI table selection of the TFC alternate setting as shown in the E-TFCI Table Selection, TS 25.321 Annex B.

0 This choice selects Table 0.

1 This choice selects Table 1.

***RST** 1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:HSUPa:TFC[:ALT]:ETFCI

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC[:ALT]:ETFCI <value>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC[:ALT]:ETFCI?
```

This command sets the E-TFC index 7-bit pattern for the TFC alternate setting. The TTI value controls the E-TFCI value as described in range field below. If a value exceeds its range, the value is clipped to the allowed maximum value for the current configuration.

***RST** 41

Range 0-127 if E-TFCI Table = 0

0-125 if E-TFCI Table = 1 and TTI = 2 ms

0-120 if E-TFCI Table = 1 and TTI = 10 ms

:ULINk:HSUPa:TTI

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TTI 2|10
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TTI?
```

This command sets the static TTI value for the HSUPA.

***RST** 10

:ULINk:HSUPa[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:[:STATe]?
```

This command turns the uplink HSUPA state to ON | 1 or OFF | 0.

***RST** 1

:ULINk:NMDPdch

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:NMDPdch 0|1
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:NMDPdch?
```

This command sets the Nmax-dpdch (maximum number of simultaneous uplink DPDCH).

***RST** 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:POLarity

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:POLarity NORMal|INVerted|INVert
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:POLarity?
```

This command selects the phase polarity of the uplink signal.

NORMal This choice selects normal polarity.

INVerted, INVert These choices perform the same function, inverting the internal Q signal.

***RST** NORM

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:SCRamblecode

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:SCRamblecode <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:SCRamblecode?
```

This command sets the scramble code.

***RST** +0

Range 0–16777215

:ULINk:SDELay

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:SDELay <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:SDELay?
```

This command sets the uplink DPCH delay, measured in slots.

***RST** +0

Range 0–119

Remarks Calculate the delay between downlink and uplink DPCH, in slots, using the following formulas. Total Delay = (T0) + (TOFFset) + ((SDELay) * 2560 chips)

- T0 = 1024 chips
- TOFFset is set by “:ULINk:TOFFset” on page 764

Slot Delay = (Total Delay - T0) / 2560

:ULINk:SFNRst:POLarity

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:SFNRst:POLarity POSitive|
NEGative
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:SFNRst:POLarity?
```

This command sets the polarity of the system frame number reset signal for the uplink synchronization source.

POSitive	This choice sets the signal to trigger when the trigger signal is high.
NEGative	This choice sets the signal to trigger when the trigger signal is low.
***RST**	POS
Remarks	This command is applicable only when SFN_RST is the sync source selection. See ":ULINk:SYNC[:SOURce]" on page 761 for selecting the sync source.

:ULINk:SYNC:MODE

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:SYNC:MODE SINGle|CONTinuous
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:SYNC:MODE?
```

This command selects the uplink frame synchronization triggering mode.

SINGle	The signal generator, once triggered, generates frames based on the reference clock.
CONTinuous	The signal generator continuously aligns the frame timing with the frame sync trigger signal.
***RST**	SING

:ULINk:SYNC[:SOURce]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:SYNC[:SOURce] SFN_RST|FCLock
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:SYNC[:SOURce]?
```

This command selects the uplink frame synchronization source type.

SFN_RST	The uplink signal triggers on the system frame number reset signal.
FCLock	The uplink signal triggers on the frame clock.
***RST**	FCL

:ULINk:TGAP:PSI[1]:CFN

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TGAP:PSI[1]:CFN <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TGAP:PSI[1]:CFN?
```

This command sets the connection frame number (CFN) for the first radio frame of the first pattern 1.

***RST** 0

Range 0–255

Remarks In the signal generator, CFN is counted internally, relative to the system sync signal.

:ULINk:TGAP:PSI[1]:D

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TGAP:PSI[1]:D <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TGAP:PSI[1]:D?
```

This command sets the transmission gap distance. It specifies the number of slots between the starting slots of two consecutive transmission gaps within a transmission gap pattern. A value of 0 indicates that there is only one transmission gap within the transmission gap pattern.

***RST** 0

Range 0, 15–269

:ULINk:TGAP:PSI[1]:L1

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TGAP:PSI[1]:L1 3|4|5|7|10|14
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TGAP:PSI[1]:L1?
```

This command specifies the length of the first transmission gap (TGL1). The length is expressed in number of slots.

***RST** +7

:ULINk:TGAP:PSI[1]:L2

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TGAP:PSI[1]:L2 0|3|4|5|7|10|14
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TGAP:PSI[1]:L2?
```

This command specifies the length of the second transmission gap (TGL2). When the value is set to 0, TGL2=TGL1.

***RST** 0

:ULINk:TGAP:PSI[1]:PL1

Supported E4438C with Option 419 and Option 400

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TGAP:PSI[1]:PL1 <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TGAP:PSI[1]:PL1?
```

This command specifies the duration of the transmission gap pattern length 1 (TGPL1). The pattern length is expressed in number of frames.

***RST** +2

Range 1–144

:ULINk:TGAP:PSI[1]:PRC

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TGAP:PSI[1]:PRC <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TGAP:PSI[1]:PRC?
```

This command sets the transmission gap pattern repetition count. The pattern repetition count (PRC) sets the number of transmission gap patterns within the transmission gap pattern sequence.

***RST** 0

Range 0–511

Remarks A value of 0 indicates that the PRC will continue indefinitely.

:ULINk:TGAP:PSI[1]:PS

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TGAP:PSI[1]:PS ACTive|INACtive
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TGAP:PSI[1]:PS?
```

This command sets the transmission gap pattern status.

ACTive	This choice sets the compressed mode active.
INACtive	This choice sets the compressed mode inactive.
***RST**	INAC

:ULINk:TGAP:PSI[1]:SN

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TGAP:PSI[1]:SN <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TGAP:PSI[1]:SN?
```

This command specifies the timeslot number of the first transmission gap within the first radio frame.

***RST** +11

Range 0–14

:ULINk:TOFFset

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TOFFset <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TOFFset?
```

This command sets the uplink DPCH timing offset (delay), measured in chips.

***RST** 0

Range –512 to 2560

Remarks The downlink signal timing is provided by the synchronization signal.

Calculate the delay between downlink and uplink DPCH, in chips, using the following formulas:

Total Delay = (T0) + (TOFFset) + ((SDELay) * 2560 chips)

- T0 = 1024 chips
- SDELay is set by “:ULINk:SDELay” on page 760

Chip Delay = (Total Delay - T0) mod 2560

:ULINk:TPControl:PATTern

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TPControl:PATTern
"<file name>"|EXTernal
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TPControl:PATTern?
```

This command sets a user pattern that determines the power control response and controls the power of the user's equipment (UE). The increase/decrease direction for UE power level changes is determined by the transmit power control (TPC) pattern.

"<file name>"	This choice specifies a user file. 0: DOWN, 1: UP
EXTernal	This choice specifies an external TPC pattern.
***RST**	EXTernal

:ULINk:TPControl:PATTern[:EXTernal]:INPut

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC:EPATtern[:EXTernal]:
INPut ALTP|BGAT|PTR2
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:HSUPa:TFC:EPATtern[:EXTernal]:
INPut?
```

This command sets the input port of the external Ack/Nack signal.

ALTP	This choice sets the input port of the external signal to ALT PWR IN.
BGAT	This choice sets the input port of the external signal to BURST GATE IN.
PTR2	This choice sets the input port of the external signal to PATT TRIG IN 2.
***RST**	PTR2
Remarks	Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:TPControl:PATTern[:EXTernal]:POLarity

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TPControl[:EXTernal]:POLarity
POSitive|NEGative
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TPControl[:EXTernal]:POLarity?
```

This command sets the external TPC signal polarity.

POSitive	This choice sets the pattern signal to DOWN when the external signal is low and sets the pattern signal to UP when the external signal is high.
NEGative	This choice sets the pattern signal to DOWN when the external signal is high and sets the pattern signal to UP when the external signal is low.
***RST**	POS
Remarks	Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:TPControl:POWer:INITial

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TPControl:POWer:INITial <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TPControl:POWer:INITial?
```

This command sets the initial power of the transmission power control, in dB (relative to Max Power: 0.00 dB).

***RST**	+0.00000000E+000
Range	0 to –40 dB
Remarks	If the parameter set by this command is changed while the signal is active, the ":ULINk:APPLy" on page 723 must be executed for the change to occur. The value must be larger than or equal to the minimum transmit power. The power difference between the initial power and the maximum power should be a multiple value of the power step. Initial power is relative to the maximum power (amplitude) set on the signal generator.

:ULINk:TPControl:POWer:MAXimum

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TPControl:POWer:MAXimum?
```

This query returns the maximum power of the transmit power control, relative to Maximum Power, in dB. The value shown for this parameter will always be 0.00 dB, and is a relative value to the maximum amplitude set for the signal generator.

For example, if the signal generator amplitude is set to –20 dBm, the Minimum Power is set to –40 dB, and the Initial Power is set to –10 dB, then the absolute initial power level will be –30 dBm, which is 10 dBm below the signal generator amplitude, and the absolute minimum power will be –60 dBm, which is 40 dBm below the signal generator amplitude.

***RST** +0.00000000E+000

:ULINk:TPControl:POWer:MINimum

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TPControl:POWer:MINimum <val>
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TPControl:POWer:MINimum?
```

This command sets the initial power of the transmission power control, in dB (relative to Max Power: 0.00 dB).

The minimum power value must be less than or equal to the value used for initial power. Minimum power is decreased in increments determined by the value set for the power step. The power difference between minimum and maximum power should be a multiple of the power step value.

Minimum power is limited by the amplitude set on the signal generator. The signal generator amplitude must be set to –96 dBm or lower for the minimum power to be set to –40 dB.

*RST – 4.00000000E+001

Range – 40 to 0 dB

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:TPControl:POWer:STEP

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TPControl:POWer:STEP
DB0_5|DB1_0|DB2_0|DB3_0
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TPControl:POWer:STEP?
```

This command sets the power control step size. Initial power can only be increased in steps set by the power step command.

***RST** DB0_5

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 723.

:ULINk:TPControl[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TPControl[:STATe] 1|0|ON|OFF
[:SOURce]:RADio:WCDMa:HSPA[:BBG]:ULINk:TPControl[:STATe]?
```

This command enables or disables the transmission power control.

***RST** 0

[:STATe]

Supported E4438C with Option 419

```
[:SOURce]:RADio:WCDMa:HSPA[:BBG][:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSPA[:BBG][:STATe]?
```

This command turns the HSPA functionality on or off.

***RST** 0

Remarks This command only works when there is at least one active physical channel within the selected link.

Real Time GPS Subsystem–Option 409 ([:SOURce]:RADio[1]|2|3|4:GPS)

:DATA

Supported E4438C with Option 409

```
[:SOURce]:RADio:GPS:DATA PN9|PN15|FIX4|"<user file>"
[:SOURce]:RADio:GPS:DATA?
```

This command sets the data type for the selected data mode.

***RST** PN9

Key Entry **PN9** **PN15** **FIX4** **User file**

Remarks This command is effective only when the data mode is RAW or ENCoded. To set the data mode, refer to ":DMODe".

:DMODe

Supported E4438C with Option 409

```
[:SOURce]:RADio:GPS:DMODe RAW|ENCoded|TLM
[:SOURce]:RADio:GPS:DMODe?
```

This command sets the data mode.

RAW This choice modulates data onto the C/A (coarse acquisition) code at 50-bits per second. No parity bits are computed by the signal generator. Every 6 seconds, 300-bits from the source data are transmitted.

ENCoded This choice modulates data onto the C/A (coarse acquisition) code at 50-bits per second. The signal generator computes 6 parity bits for every 24 data bits from the selected data source. Every six seconds, 240-bits of the source data are transmitted along with 60 computed parity bits.

TLM This choice transmits a standard default navigation data transmission which includes a telemetry word (TLM), a handover word (HOW), and default navigation data. The signal generator transmits an incrementing time-of-week (TOW) as part of the HOW.

***RST**	RAW
Key Entry	**Data Mode Raw Enc TLM**
Remarks	Since the TLM mode transmits default navigation data, there is no data selection for this mode.
	For selecting the data type when RAW or ENCoded is the selection, refer to “:DATA” on page 769.

:DSHift

Supported E4438C with Option 409

```
[:SOURce]:RADio:GPS:DSHift <val>
[:SOURce]:RADio:GPS:DSHift?
```

This command sets the frequency and chip rate offsets to simulate a doppler shift.

The variable `<val>` is expressed in units of hertz (Hz to kHz).

***RST**	+0.00000000E+000
Range	–125kHZ to 125kHZ
Key Entry	**Doppler Shift**
Remarks	The lower bound of the doppler shift is limited by the frequency set on the signal generator. For example, if the signal generator frequency is set to 100 kHz, then the lower limit of the doppler shift would be 0.00 Hz. The doppler shift can not extend lower than the limitations of the signal generator

:FILTer

Supported E4438C with Option 409

```
[:SOURce]:RADio:GPS:FILTer RNYQuist|NYQuist|GAUSsian|RECTangle|
IS95|IS95_EQ|IS95_MOD|IS95_MOD_EQ|AC4Fm|UGGaussian|"<user FIR>"
[:SOURce]:RADio:GPS:FILTer?
```

This command sets the pre-modulation filter type.

IS95	This choice selects a filter that meets the criteria of the IS-95 standard.
IS95_EQ	This choice selects a filter which is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard. This filter is only used for IS-95 baseband filtering.

IS95_MOD	This choice selects a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.
IS95_MOD_EQ	This choice selects a filter which is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection.
AC4Fm	This choice selects a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.
UGGaussian	This choice selects a backwards compatible GSM Gaussian filter (Gaussian filter with a fixed BbT value of 0.300) for the ESG E44xxB Option UN3 or UN4.
`"<user FIR>"`	This variable is any filter file that you have stored into memory.
***RST**	RECT
Key Entry	**Root Nyquist** **Nyquist** **Gaussian** **Rectangle** **IS-95** **IS-95 w/EQ** **IS-95 Mod** **IS-95 Mod w/EQ** **APCO25 C4FM** **UN3/4 GSM Gaussian** **User FIR**

:FILTer:ALPHa

Supported E4438C with Option 409

```
[:SOURce]:RADio:GPS:FILTer:ALPHa <val>
[:SOURce]:RADio:GPS:FILTer:ALPHa?
```

This command sets the Nyquist or root Nyquist filter’s alpha value.

The filter alpha value can be set to the minimum value (0), maximum value (1), or in between by using fractional numeric values (0.001–0.999).

***RST**	+2.20000000E-001
Range	0.000–1.000
Key Entry	**Filter Alpha**
Remarks	To change the current filter type, refer to “:FILTer” on page 770.

:FILTer:BBT

Supported E4438C with Option 409

```
[:SOURce]:RADio:GPS:FILTer:BBT <val>
[:SOURce]:RADio:GPS:FILTer:BBT?
```

This command changes the bandwidth-multiplied-by-bit-time (BbT) filter parameters.

The filter BbT value can be set to the minimum value (0), the maximum value (1), or in between by using fractional numeric values (0.001–0.999)

***RST** +5.00000000E-001

Range 0.000–1.000

Key Entry **Filter BbT**

Remarks This command is effective only after choosing a Gaussian filter. It does not have an effect on other types of filters.

To change the current filter type, refer to ":FILTer" on page 770.

:FILTer:CHANnel

Supported E4438C with Option 409

```
[:SOURce]:RADio:GPS:FILTer:CHANnel EVM|ACP
[:SOURce]:RADio:GPS:FILTer:CHANnel?
```

This command optimizes the Nyquist and root Nyquist filters to minimize error vector magnitude (EVM) or to minimize adjacent channel power (ACP).

EVM This choice provides the most ideal passband.

ACP This choice improves stopband rejection.

***RST** EVM

Key Entry **Optimize FIR For EVM ACP**

Remarks To change the current filter type, refer to ":FILTer" on page 770.

:IQPHase

Supported E4438C with Option 409

```
[:SOURce]:RADio:GPS:IQPHase NORMal|INVerted
[:SOURce]:RADio:GPS:IQPHase?
```

This command sets the I/Q phase for the GPS signal.

NORMal	This choice selects normal phase polarity.
INVerted	This choice inverts the internal Q signal.
***RST**	NORM
Key Entry	**IQ Phase Normal Invert**

:PCODe

Supported E4438C with Option 409

```
[:SOURce]:RADio:GPS:PCODe <val>
[:SOURce]:RADio:GPS:PCODe?
```

This command sets the P code power relative to the C/A code power.

***RST**	–3.00000000E+000
Range	–40 to 0
Key Entry	**P Code Pwr**
Remarks	This command is normally used when the CAP (C/A+P) ranging mode choice is selected. Refer to ":RCODe" for selecting the ranging mode.

:RCODe

Supported E4438C with Option 409

```
[:SOURce]:RADio:GPS:RCODe CA|P|CAP
[:SOURce]:RADio:GPS:RCODe?
```

This command selects the ranging code for the GPS transmission.

CA	This choice selects a 1023-bit pseudorandom C/A (coarse acquisition) code that is BPSK modulated onto the L1 (1575.42 MHz) carrier. The C/A code factory set chip rate is 1.023 Mcps using a 10.23 Mcps reference clock.

P	This choice selects the precise (P) code which is a very long pseudorandom sequence that is BPSK modulated onto the L2 (1227.6 MHz) carrier. The P code factory set chip rate is 10.23 Mcps using a 10.23 Mcps reference clock.
CAP	This choice permits both the C/A (coarse acquisition) and P (precise) codes to modulate the L1 (1575.42 MHz) carrier simultaneously by providing the P code on the Q component and the C/A code in quadrature on the I component.
***RST**	CA
Key Entry	**Ranging Code C/A P C/A+P**

:REFClk

Supported E4438C with Option 409

```
[:SOURce]:RADio:GPS:REFClk INT|Ext
[:SOURce]:RADio:GPS:REFClk?
```

This command sets the GPS reference clock to either internal or external.

INT	This selection sets the signal generator to use the internal chip clock.
EXT	This selection sets the signal generator to use an external chip clock which is supplied to the DATA CLOCK INPUT connector.
***RST**	INT
Key Entry	**GPS Ref Clk**

:REFFreq

Supported E4438C with Option 409

```
[:SOURce]:RADio:GPS:REFFreq <val><unit>
[:SOURce]:RADio:GPS:REFFreq?
```

This command sets the GPS reference clock frequency. If an external source is being used, its frequency must match the value set with this command

***RST**	+1.02300000E+007
Range	1kCPS–12.5MCPS
Key Entry	**GPS Ref (f0)**
Remarks	Changing the GPS reference frequency will change the P and C/A code chip rates.

:SATid

Supported E4438C with Option 409

```
[:SOURce]:RADio:GPS:SATid <val>
[:SOURce]:RADio:GPS:SATid?
```

This command selects the pseudorandom number (PRN) code used for transmission.

Satellite identification numbers 1–32 are used for GPS satellites. Satellite identification numbers 33–37 are reserved for ground transmitter use in the real-world system.

***RST** +1

Range 1–37

Key Entry **Satellite ID**

[:STATe]

Supported E4438C with Option 409

```
[:SOURce]:RADio:GPS[:STATe] ON|OFF|1|0
[:SOURce]:RADio:GPS[:STATe]?
```

This command enables or disables the real-time GPS signal.

***RST** 0

Key Entry **Real-time GPS Off On**

Real Time MSGPS Subsystem–Option 409 ([:SOURce]:RADio[1]|2|3|4:MSGPs)

:IQPHase

Supported E4438C with Option 409

```
[:SOURce]:RADio:MSGPs:IQPHase NORMal|INVerted
[:SOURce]:RADio:MSGPs:IQPHase?
```

This command sets the I/Q phase for the MSGPS signal.

NORMal	This choice selects normal phase polarity.
INVerted	This choice inverts the internal Q signal.
***RST**	NORM
Key Entry	**IQ Phase Normal Invert**

:PMODe

Supported E4438C with Option 409

```
[:SOURce]:RADio:MSGPs:PMODe RUN|PAUSe
[:SOURce]:RADio:MSGPs:PMODe?
```

This command pauses or plays the real-time MSGPS scenario.

***RST**	RUN
Key Entry	**Pause/Resume**

:REFClk

Supported E4438C with Option 409

```
[:SOURce]:RADio:MSGPs:REFClk INTernal|EXTernal
[:SOURce]:RADio:MSGPs:REFClk?
```

This command sets the MSGPS reference clock to either internal or external.

INTernal This selection sets the signal generator to use the internal chip clock.

EXTernal This selection sets the signal generator to use an external chip clock which is supplied to the DATA CLOCK INPUT connector.

***RST** INT

Key Entry **GPS Ref Clk**

:REFFreq

Supported E4438C with Option 409

```
[:SOURce]:RADio:MSGPs:REFFreq <val><unit>
[:SOURce]:RADio:MSGPs:REFFreq?
```

This command sets the MSGPS reference clock frequency. If an external reference clock is being used, its frequency must match the value set with this command

***RST** +1.02300000E+007

Range 1.023Mcps ±10%

Key Entry **GPS Ref (f0)**

Remarks Changing the GPS reference frequency will change the C/A code chip rate.

:RESTart

Supported E4438C with Option 409

```
[:SOURce]:RADio:MSGPs:RESTart
```

This command sets the real-time MSGPS scenario to the beginning.

Key Entry **Restart**

:SCENario

Supported E4438C with Option 409

```
[:SOURce]:RADio:MSGPs:SCENario "<file_name>"
[:SOURce]:RADio:MSGPs:SCENario?
```

This command selects the real-time MSGPS scenario to play.

Key Entry **Select Scenario**

:SCENario:SATellites

Supported E4438C with Option 409

```
[:SOURce]:RADio:MSGPs:SCENario:SATellites <val>
[:SOURce]:RADio:MSGPs:SCENario:SATellites?
```

This command sets the number of satellites in view to include in the generated MSGPS signal.

Key Entry **Number of Satellites**

:SCENario:STATus

Supported E4438C with Option 409

```
[:SOURce]:RADio:MSGPs:SCENario:STATus?
```

This query returns the following information for the currently selected scenario as a comma-separated list:

Scenario date, scenario time, scenario position, scenario length, satellite IDs

Key Entry **Scenario**

[:STATe]

Supported E4438C with Option 409

```
[:SOURce]:RADio:MSGPs[:STATe] ON|OFF|1|0
[:SOURce]:RADio:MSGPs[:STATe]?
```

This command enables or disables the real-time MSGPS signal.

***RST** 0

Key Entry **Real-time MSGPS Off On**

GSM Subsystem–Option 402 ([:SOURce]:RADio:GSM)

:ALPha

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:ALPHa <val>
[:SOURce]:RADio:GSM:ALPHa?
```

This command changes the Nyquist or root Nyquist filter’s alpha value.

The filter alpha value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +5.00000000E–001

Range 0.000–1.000

Key Entry **Filter Alpha**

Remarks To change the current filter type, refer to “:FILTer” on page 792.

:BBCLock

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:BBCLock INT[1]|EXT[1]
[:SOURce]:RADio:GSM:BBCLock?
```

This command toggles the data (bit) clock input to the baseband generator board to either internal or external. This command is independent in each mode and works for both non-burst (continuous) and burst modes. This allows for a matrix of selections between burst/non-burst, internal/external data generation, internal/external data clock, and external bit/symbol data clock.

INT[1] This choice selects the signal generator internal data clock.

EXT[1] This choice selects an external data clock input.

***RST** INT

Key Entry **BBG Data Clock Ext Int**

Remarks A data clock or continuous symbol sync input must be supplied when external mode is used.

This will be ignored if the external reference is set to EXTernal. To change the external reference type, refer to “:EREFerence” on page 791.

:BBT

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:BBT <val>
[:SOURce]:RADio:GSM:BBT?
```

This command changes the bandwidth-multiplied-by-bit-time (BbT) filter parameter.

The filter BbT value can be set to the maximum level (1) or in between the minimum level (0.100) and maximum level by using fractional numeric values (0.101–0.999).

***RST** +3.00000000E–001

Range 0.100–1.000

Key Entry **Filter BbT**

Remarks This command is effective only after choosing a Gaussian filter. It does not have an effect on other types of filters.

To change the current filter type, refer to ":FILTer" on page 792.

:BRATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:BRATe <val>
[:SOURce]:RADio:GSM:BRATe?
```

This command sets the bit rate in bits per second (bps–Mbps). The maximum bit rate is dependent on the modulation type and filter as shown in the following tables.

NOTE When using multiframe, limit the symbol rate to no more than 271 ksps. Although higher rates may work, they are not supported. See ":SRATe" on page 810 for data stated as symbol rates.

The IQ digital data stream is shaped by a FIR filter. The filter length and associated latency and frequency response are dependent on the bit rate as shown in the following tables. The signal generator selects a filter length.

For higher bit rates, the FIR filter length may be truncated (if the minimum filter size allows it) which will impact the relative timing of the modulated data, as well as the actual filter response (see the symbol rate command ":SRATe" on page 972). Refer to ":FILTer" on page 792 for information on filter symbol widths.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 795.

When the bit rate is changed, the ESG reconfigures the baseband generator. The time required to reconfigure the baseband generator is inversely proportional to the bit rate: lower bit rates require more time.

***RST** +2.70833333E+005

Range

Modulation Type	Bit Rate Range		
	16 Symbol Wide Filter	*32 Symbol Wide Filter*	*64 Symbol Wide Filter*
BPSK, FSK2, MSK	1bps–50Mbps	1bps–25Mbps	1bps–12.5Mbps
C4FM, OQPSK, FSK4	2bps–50Mbps	2bps–25Mbps	2bps–12.5Mbps
OQPSKI95, QPSK			
P4QPPSK, QPSKIS95			
GRAYQPSK, QAM4			
D8PSK, EDGE, FSK8, PSK8	3bps–50Mbps	3bps–25Mbps	3bps–12.5Mbps
FSK16, PSK16, QAM16	4bps–50Mbps	4bps–25Mbps	4bps–12.5Mbps
QAM32	5bps–50Mbps	5bps–25Mbps	5bps–12.5Mbps
QAM64	6bps–50Mbps	6bps–25Mbps	6bps–12.5Mbps
QAM128	7bps–50Mbps	7bps–25Mbps	7bps–12.5Mbps
QAM256	8bps–50Mbps	8bps–25Mbps	8bps–12.5Mbps

Key Entry **Symbol Rate**

:BURSt:PN9

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:BURSt:PN9 NORMal|QUICk
[:SOURce]:RADio:GSM:BURSt:PN9?
```

This command controls the software PN9 generation.

NORMal This choice produces a maximum length PN9 sequence.

QUICk This choice produces a truncated PN9 sequence.

***RST** NORM

Key Entry PN9 Mode Normal Quick

Remarks Use Normal mode for bit-error-rate tests where a maximum length PN9 sequence is required.

:BURSt:SHAPe:FALL:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:BURSt:SHAPe:FALL:DELay <val>
[:SOURce]:RADio:GSM:BURSt:SHAPe:FALL:DELay?
```

This command sets the burst shape fall delay.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +0.00000000E+000

Range –11.0625 to 99

Key Entry **Fall Delay**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 795. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:FDELay" on page 783 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:FALL:TIME

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:BURSt:SHAPe:FALL:TIME <val>
[:SOURce]:RADio:GSM:BURSt:SHAPe:FALL:TIME?
```

This command sets the burst shape fall time.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +1.00000000E+001

Range 0.0625–127.9375

Key Entry Fall Time

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 795. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:FTIMe" on page 784 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:FDELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:BURSt:SHAPe:FDELay <val>
[:SOURce]:RADio:GSM:BURSt:SHAPe:FDELay?
```

This command sets the burst shape fall delay.

The variable <val> is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +0.00000000E+000

Range –11.0625 to 99

Key Entry Fall Delay

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 795. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:FALL:DELay" on page 782 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:FTIMe

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:BURSt:SHAPe:FTIMe <val>
[:SOURce]:RADio:GSM:BURSt:SHAPe:FTIMe?
```

This command sets the burst shape fall time.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +3.00000000E+000

Range 0.0625–127.9375

Key Entry Fall Time

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 795. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:FALL:TIME" on page 782 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:RDELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:BURSt:SHAPe:RDELay <val>
[:SOURce]:RADio:GSM:BURSt:SHAPe:RDELay?
```

This command sets the burst shape rise delay.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate. For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide.*

***RST** +0.00000000E+000

Range –8.0625 to 99

Key Entry Rise Delay

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 795. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:RISE:DELay" on page 785 performs the same function; in compliance with the SCPI standard, both commands are listed.

:BURSt:SHAPe:RISE:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:BURSt:SHAPe:RISE:DELay <val>
[:SOURce]:RADio:GSM:BURSt:SHAPe:RISE:DELay?
```

This command sets the burst shape rise delay.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate. For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

***RST** +0.00000000E+000

Range –8.0625 to 99

Key Entry Rise Delay

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 795. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:RDELay" on page 784 performs the same function; in compliance with the SCPI standard, both commands are listed.

:BURSt:SHAPe:RISE:TIME

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:BURSt:SHAPe:RISE:TIME <val>
[:SOURce]:RADio:GSM:BURSt:SHAPe:RISE:TIME?
```

This command sets the burst shape rise time.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate. For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

***RST** +3.00000000E+000

Range 0.0625–11.1875

Key Entry Rise Time

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 795. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:RTIMe" on page 786 performs the same function; in compliance with the SCPI standard, both commands are listed.

:BURSt:SHAPe:RTIMe

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:BURSt:SHAPe:RTIMe <val>
[:SOURce]:RADio:GSM:BURSt:SHAPe:RTIMe?
```

This command sets the burst shape rise time.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate. For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

***RST** +3.00000000E+000

Range 0.0625–11.1875

Key Entry Rise Time

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to “:MODulation[:TYPE]” on page 795. Refer to “:SRATe” on page 972 for a list of the minimum and maximum symbol rate values.

“:BURSt:SHAPe:RISE:TIME” on page 786 performs the same function; in compliance with the SCPI standard, both commands are listed.

:BURSt:SHAPe[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:BURSt:SHAPe[:TYPE] SINE|"<file name>"
[:SOURce]:RADio:GSM:BURSt:SHAPe[:TYPE]?
```

This command specifies the burst shape as either `SINE` or a user-defined file (`"<file name>"`).

SINE This choice selects a state that is defined by the burst rise and fall *RST values, as the default burst shape type.

`"<file name>"` This choice selects a user designated file from signal generator memory (non-volatile).

***RST** SINE

Key Entry **Sine** **User File**

:BURSt[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:BURSt[:STATe] ON|OFF|1|0
[:SOURce]:RADio:GSM:BURSt[:STATe]?
```

This command enables or disables the burst function.

ON (1) This choice enables the transmission of framed data. If all timeslots which are switched on are up traffic channels or custom, you will be bursting the timeslots that are on; there will be no RF carrier during the off timeslots.

If you have switched on any timeslot that you have configured as a down traffic channel, the RF carrier is not switched off between any of the timeslots. The off timeslots are transmitted as a continuous series of ones for the time period of the off timeslots.

OFF (0) This choice enables the transmission of unframed data.

***RST** 0

Key Entry Data Format Pattern Framed

:CHANnel

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:CHANnel EVM|ACP
[:SOURce]:RADio:GSM:CHANnel?
```

This command optimizes the Nyquist and root Nyquist filters to minimize error vector magnitude (EVM) or to minimize adjacent channel power (ACP).

EVM This choice provides the most ideal passband.

ACP This choice improves stopband rejection.

***RST** ACP

Key Entry **Optimize FIR For Evm ACP**

Remarks To change the current filter type, refer to ":FILTer" on page 792.

:DATA

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:DATA PN9|PN11|PN15|PN20|PN23|FIX4|"<file name>"|
EXT|P4|P8|P16|P32|P64|PRAM
[:SOURce]:RADio:GSM:DATA?
```

This command sets the data pattern type (pseudo-random number sequence, 4-bit pattern, sequence of 1's and 0's, data from an external source, or a user file) for unframed data transmission.

***RST** PN23

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **Ext**

4 1's & 4 0's **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's**

64 1's & 64 0's **PRAM File**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:DATA:PRAM

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:DATA:PRAM "<file_name>"
[:SOURce]:RADio:GSM:DATA:PRAM?
```

This command selects a pattern RAM (PRAM) file as the pattern data type for the GSM (Global System for Mobile communication) format.

`"<file_name>"` This variable designates the PRAM file in WFM1. Refer to "File Name Variables" on page 13 for information on the file name syntax.

Key Entry **PRAM File**

Remarks Selecting this data source forces the burst source to `INTernal` to allow framing control.

The PRAM file must reside in the signal generator's volatile memory (WFM1) in order to be accessed by this command. For more information on PRAM files, refer to ":DATA:PRAM:FILE:BLOCk" on page 112.

:DATA:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:DATA:FIX4 <val>
[:SOURce]:RADio:GSM:DATA:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern for unframed transmission according to the modulation type, symbol rate, filter, and burst shape selected for the GSM modulation format.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks `FIX4` must already be defined as the data type.

:DEFault

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:DEFault
```

This command returns all of the GSM format parameters to their factory default conditions. It does not affect any other signal generator parameters.

Key Entry Restore GSM Factory Default

:DENCode

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:DENCode ON|OFF|1|0
[:SOURce]:RADio:GSM:DENCode?
```

This command enables or disables the differential data encoding function. Once this function is enabled, data bits are encoded prior to modulation; each modulated bit is 1 if the data bit is different from the previous one, or 0 if the data bit is the same as the previous one.

***RST** 1

Key Entry **Diff Data Encode Off On**

EDATa:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:EDATa:DELay?
```

This query returns the amount of delay (in symbols) from the external data input to the beginning of the symbol on the I OUT and Q OUT rear panel connectors and the front panel RF OUTPUT connector.

Remarks When the format is turned off, the delay value is unchanged; the query will return the same delay value if the format is on or off.

:EDCLock

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:EDCLock SYMBol|NORMal
[:SOURce]:RADio:GSM:EDCLock?
```

This command sets the external data clock use.

SYMBol This choice specifies that a continuous symbol clock signal must be provided to the SYMBOL SYNC input connector.

NORMal This choice specifies that the DATA CLOCK input connector requires a bit clock. The SYMBOL SYNC input connector requires a (one-shot or continuous) symbol sync signal.

***RST** NORM

Key Entry **Ext Data Clock Normal Symbol**

Remarks Both choices have no effect in internal clock mode. Refer to ":BBCLock" on page 779 to select EXT as the data clock type.

:EREFerence

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:EREFerence INT|EXT
[:SOURce]:RADio:GSM:EREFerence?
```

This command selects either an internal or external bit-clock reference for the data generator.

***RST** INT

Key Entry **BBG Ref Ext Int**

Remarks If the EXT choice is selected, the external source's frequency value must be applied to the BASEBAND GEN REF IN rear panel connector. The external reference and external data clock are not applicable at the same time. If both are selected, then the external reference takes precedence.

:EREFerence:VALue

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:EREFerence:VALue <val>
[:SOURce]:RADio:GSM:EREFerence:VALue?
```

This command sets the expected bit-clock reference frequency value for an externally applied reference signal.

The variable `<val>` is expressed in units of hertz (Hz–MHz).

***RST** +1.30000000E+007

Range 2.5E5–1E8

Key Entry **Ext BBG Ref Freq**

Remarks The value specified by this command is effective only when you are using an external reference applied to the BASEBAND GEN REF IN rear panel connector.

Refer to ":EREFerence" on page 791 to select EXT (external source) as the reference for the bit-clock reference.

:FILTer

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:FILTer RNYQuist|NYQuist|GAUSsian|RECTangle|
IS95|IS95_EQ|IS95_MOD|IS95_MOD_EQ|AC4Fm|UGGaussian|"<user FIR>"
[:SOURce]:RADio:GSM:FILTer?
```

This command selects the pre-modulation filter type.

IS95 This choice selects a filter that meets the criteria of the IS-95 standard.

IS95_EQ This choice selects a filter which is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard. This filter is only used for IS-95 baseband filtering.

IS95_MOD This choice selects a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.

IS95_MOD_EQ This choice selects a filter which is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance), with lower passband rejection.

AC4Fm This choice selects a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.

UGGaussian This choice selects a backwards compatible GSM Gaussian filter (Gaussian filter with a fixed BbT value of 0.300) for the ESG E44xxB Option UN3 or UN4.

"<user FIR>" This variable is any filter file that you have stored into memory.

***RST** GAUS

Key Entry **Root Nyquist** **Nyquist** **Gaussian** **Rectangle** **IS-95** **IS-95 w/EQ** **IS-95 Mod** **IS-95 Mod w/EQ** **APCO 25 C4FM** **UN3/4 GSM Gaussian** **User FIR**

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:IQ:SCALe

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:IQ:SCALe <val>
[:SOURce]:RADio:GSM:IQ:SCALe?
```

This command sets the amplitude of the I/Q outputs for better adjacent channel power (ACP); lower scaling values equate to better ACP.

The variable `<val>` is expressed in units of percent.

***RST** +100

Range 1–200

Key Entry **I/Q Scaling**

Remarks This command has no effect with MSK or FSK modulation.

:MODulation:FSK[:DEViation]

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:MODulation:FSK[:DEViation] <val>
[:SOURce]:RADio:GSM:MODulation:FSK[:DEViation]?
```

This command sets the symmetric FSK frequency deviation value.

The variable `<val>` is expressed in units of Hertz and the maximum range value equals the current symbol rate value multiplied by four, limited to 20 MHz.

***RST** +4.00000000E+002

Range 0–2E7

Key Entry **Freq Dev**

Remarks To change the modulation type, refer to ":MODulation[:TYPE]" on page 795.

Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

To set an asymmetric FSK deviation value, refer to the *E4428C/38C ESG Signal Generators User's Guide* for more information.

:MODulation:MSK[:PHASe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:MODulation:MSK[:PHASe] <val>
[:SOURce]:RADio:GSM:MODulation:MSK[:PHASe]?
```

This command sets the MSK phase deviation value. The variable `<val>` is in units of degrees

***RST** +9.00000000E+001

Range 0–100

Key Entry Phase Dev

:MODulation:UFSK

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:MODulation:UFSK "<file name>"
[:SOURce]:RADio:GSM:MODulation:UFSK?
```

This command selects a user-defined FSK file from the signal generator memory.

Key Entry **User FSK**

Remarks The user-defined FSK file is held in signal generator memory until the command that selects user FSK as the modulation type is sent. See ":MODulation[:TYPE]" on page 795 to change the current modulation type.

See "File Name Variables" on page 13 for information on the file name syntax.

:MODulation:UIQ

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:MODulation:UIQ "<file name>"
[:SOURce]:RADio:GSM:MODulation:UIQ?
```

This command selects a user-defined I/Q file from the signal generator memory.

Key Entry **User I/Q**

Remarks The user-defined I/Q file is held in signal generator memory until the command that selects user I/Q as the modulation type is sent. Refer to ":MODulation[:TYPE]" on page 795 to change the current modulation type.

See "File Name Variables" on page 13 for information on the file name syntax.

:MODulation[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:MODulation[:TYPE] BPSK|QPSK|IS95QPSK|
GRAYQPSK|OQPSK|IS95OQPSK|P4DQPSK|PSK8|PSK16|D8PSK|MSK|FSK2|FSK4|FSK8|
FSK16|C4FM|QAM4|QAM16|QAM32|QAM64|QAM128|QAM256|UIQ|UFSK
[:SOURce]:RADio:GSM:MODulation[:TYPE]?
```

This command sets the modulation type for the GSM personality.

***RST** MSK

Key Entry **BPSK** **QPSK** **IS-95 QPSK** **Gray Coded QPSK** **OQPSK** **IS-95 OQPSK** **π/4 DQPSK** **8PSK** **16PSK** **D8PSK** **MSK** **2-Lvl FSK** **4-Lvl FSK** **8-Lvl FSK** **16-Lvl FSK** **C4FM** **4QAM** **16QAM** **32QAM** **64QAM** **128QAM** **256QAM** **User I/Q** **User FSK**

:POLarity[:ALL]

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:POLarity[:ALL] NORMal|INVerted
[:SOURce]:RADio:GSM:POLarity[:ALL]?
```

This command sets the rotation direction of the phase modulation vector.

NORMal This choice selects normal phase polarity.

INVerted This choice inverts the internal Q signal.

***RST** NORM

Key Entry **Phase Polarity Normal Invert**

Remarks This command is useful for lower sideband mixing applications.

:SECondary:RECall

Supported E4438C with Option 402

`[:SOURce]:RADio:GSM:SECondary:RECall`

This command recalls the secondary frame configuration, overwriting the current state.

Key Entry **Recall Secondary Frame State**

Remarks To save a secondary frame state, refer to ":SECondary:SAVE" on page 796.

A secondary frame is not active until the secondary state is enabled. To activate a secondary frame, refer to ":SECondary[:STATe]" on page 797.

:SECondary:SAVE

Supported E4438C with Option 402

`[:SOURce]:RADio:GSM:SECondary:SAVE`

This command saves the current frame configuration as the secondary frame with the filename `GSM_SECONDARY_FRAME`.

Key Entry **Save Secondary Frame State**

Remarks To recall the secondary frame state (saved in non-volatile signal generator memory), refer to ":SECondary:RECall" on page 796.

:SECondary:TRIGger[:SOURce]

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SECondary:TRIGger[:SOURce] KEY|EXT|BUS
[:SOURce]:RADio:GSM:SECondary:TRIGger[:SOURce]?
```

This command selects the type of triggering for the secondary frame.

KEY This choice enables triggering by pressing the front panel **Trigger** hardkey.

EXT This choice enables triggering using an externally applied signal at the PATT TRIG IN rear panel connector or the PATT TRIG IN 2 pin on the rear panel AUX I/O connector. To select the appropriate connector, refer to ":TRIGger[:SOURce]:EXTernal[:SOURce]" on page 816.

BUS This choice enables GPIB triggering using the `*TRG` or `GET` command or LAN and RS-232 triggering using the `*TRG` command.

Key Entry **Trigger Key** **Ext** **Bus**

:SECondary[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SECondary[:STATe] ON|OFF|1|0
[:SOURce]:RADio:GSM:SECondary[:STATe]?
```

This command enables or disables the ability to switch to the secondary frame.

***RST** 0

Key Entry **Secondary Frame Off On**

Remarks A frame must already be saved as the secondary frame in order to turn the secondary state function on. To save a frame as the secondary frame, refer to ":SECondary:SAVE" on page 796.

:SLOT0|[1]|2|3|4|5|6|7:ACCess:ENCRyption

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:ACCess:ENCRyption
PN9|PN15|FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:ACCess:ENCRyption?
```

This command creates and configures an access encrypted data field.

***RST** PN9

Key Entry **PN9** **PN15** **FIX4** **User File** **Ext** **4 1's & 4 0's** **8 1's & 8 0's**

16 1's & 16 0's **32 1's & 32 0's** **64 1's & 64 0's**

Remarks See "File Name Variables" on page 13 for information on the file name syntax.

:SLOT0|[1]|2|3|4|5|6|7:ACCess:ENCRyption:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:ACCess:ENCRyption:FIX4 <val>
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:ACCess:ENCRyption:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected access timeslot encryption field.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks `FIX4` must already be defined as the data type.

:SLOT0|[1]|2|3|4|5|6|7:ACCess:ETAil

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:ACCess:ETAil <bit_pattern>
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:ACCess:ETAil?
```

This command specifies the extended tail bits (8 bits) field for the selected access timeslot.

***RST** #H3A

Range #H00–#HFF

Key Entry **ET**

:SLOT0|[1]|2|3|4|5|6|7:ACCess:SSEQuence

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:ACCess:SSEQuence <bit_pattern>
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:ACCess:SSEQuence?
```

This command specifies the synchronization sequence bits (41 bits) for the selected access timeslot.

***RST** #H096FF335478

Range #H0–#H1FFFFFFFFFF

Key Entry **SS**

:SLOT0|[1]|2|3|4|5|6|7:ACCess:CUSTom

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:CUSTom PN9|PN15|FIX4|
"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:CUSTom?
```

This command configures the data field for the selected custom timeslot.

***RST** PN9

Key Entry **PN9** **PN15** **FIX4** **User File** **Ext** **4 1's & 4 0's** **8 1's & 8 0's**

16 1's & 16 0's **32 1's & 32 0's** **64 1's & 64 0's**

Remarks See "File Name Variables" on page 13 for information on the file name syntax.

:SLOT0|[1]|2|3|4|5|6|7:CUSTom:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:CUSTom:FIX4 <val>
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:CUSTom:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected custom timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type.

:SLOT0|[1]|2|3|4|5|6|7:DUMMy:TSEQuence

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:DUMMy:TSEQuence TSC0|
TSC1|TSC2|TSC3|TSC4|TSC5|TSC6|TSC7|<bit_pattern>
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:DUMMy:TSEQuence?
```

This command changes the 26-bit dummy training sequence (TS) for the selected dummy timeslot.

***RST** #H0000000

Range <bit_pattern>: #H0–#H3FFFFFF

Key Entry **TSC0** **TSC1** **TSC2** **TSC3** **TSC4** **TSC5** **TSC6** **TSC7**

Custom TS

Remarks When normal preset is selected, the preset hexadecimal value for TS reflects the GSM protocol, however you may use this command to enter a new value.

:SLOT0|[1]|2|3|4|5|6|7:MULTislot

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:MULTislot ON|OFF|1|0
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:MULTislot?
```

This command turns bursting (ramping) on or off between the selected timeslot and the next higher numbered adjacent timeslot.

ON (1) This choice turns ramping off between timeslots.

OFF (0) This choice turns ramping on between timeslots.

***RST**	0
Key Entry	**Multislot Off On**

SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption

Supported	E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption
PN9|PN15|FIX4|"<filename>"|EXT|P4|P8|P16|P32|P64|TCHFS|TCHHS|CS1|CS4|
DMCS1|UMCS1|BCH1|BCH2
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption?
```

This command creates and configures an encrypted data field for a normal timeslot.

PN9	This choice uses a standard PN9 bit pattern. In the case of TDMA bursted data, a PN9 repeats continuously, running from one timeslot to the matching timeslot in the next frame.
PN15	This choice uses a standard PN15 bit pattern. In the case of TDMA bursted data, a PN15 repeats continuously, running from one timeslot to the matching timeslot in the next frame.
FIX4	This choice uses a fixed 4-bit pattern. The selected 4-bit pattern will be repeated as necessary to fill the selected data to set the desired pattern.
User File	This choice selects a user-supplied file to be used as the bit pattern. In the case of TDMA bursted data, enough bits must be supplied to fill the desired number of timeslots (left over bit are ignored). User files contain 8 data bits per byte.
EXT	This choice uses an external user signal as the modulating data stream. Serial data is supplied via the front panel DATA BNC connector.
P4	This choice selects a data pattern with 4 1's followed by 4 0's. The selected pattern will be repeated as necessary to fill the selected data area.
P8	This choice selects a data pattern with 8 1's followed by 8 0's. The selected pattern will be repeated as necessary to fill the selected data area.
P16	This choice selects a data pattern with 16 1's followed by 16 0's. The selected pattern will be repeated as necessary to fill the selected data area.
P32	This choice selects a data pattern with 32 1's followed by 32 0's. The selected pattern will be repeated as necessary to fill the selected data area.
P64	This choice selects a data pattern with 64 1's followed by 64 0's. The selected pattern will be repeated as necessary to fill the selected data area.
TCHFS	This choice selects traffic channel with full rate speech (TCH/FS). This channel would be represented by a 26 frame multiframe with an SACCH and IDLE frame.

TCHHS	This choice selects traffic channel with half rate speech (TCH/HS). This is when a complex coding scheme is used that can allow two mobile stations to share the same timeslot. On an ESG this is represented by having one timeslot with a normal burst and user definable training sequence and the same timeslot on an alternate frame using a dummy burst. This represents the situation where TCH/HS is being used in one timeslot and the other timeslot is not being used.
CS-1	This choice selects the CS-1 channel, a packet data traffic channel with block type 1 as per 3GPP standard GSM 05.03.
CS4	This choice selects the CS-4 channel, a packet data traffic channel with block type 4 as per 3GPP standard GSM 05.03.
DMCS1	This choice selects the downlink MCS-1 channel, a packet data traffic channel with block type 5 as per 3GPP standard GSM 05.03.
UMCS1	This choice selects the uplink MCS-1 channel, a packet data traffic channel with block type 5 as per 3GPP standard GSM 05.03.
BCH1	This choice selects a non-combined broadcast channel. BCH1 can only be set in timeslot zero and can be the only multiframe type in a frame. This means that BCH1 will conflict with the following parameters: TCH/FS, TCH/HS, CS-1, CS-4, DMCS-1 and UMCS-1.
BCH2	This choice selects a combined broadcast channel. BCH2 can only be set in timeslot zero and can be the only multiframe type in a frame. This means that BCH2 will conflict with the following parameters: TCH/FS, TCH/HS, CS-1, CS-4, DMCS-1, and UMCS-1.

***RST** PN9

Range BCH1: 0–65535
BCH2: 0–65535

Key Entry **PN9** **PN15** **FIX4** **User File** **Ext** **4 1’s & 4 0’s** **8 1’s & 8 0’s**

16 1’s & 16 0’s **32 1’s & 32 0’s** **64 1’s & 64 0’s** **TCH/FS** **TCH/HS**

CS-1 **CS-4** **Downlink MCS-1** **Uplink MCS-1**

Remarks See “File Name Variables” on page 13 for information on the file name syntax.

:SLOT0:NORMal:ENCRyption:BCH1:BCC

Supported E4438C with Option 416

```
[:SOURce]:RADio:GSM:SLOT0:NORMal:ENCRyption:BCH1:BCC <val>
[:SOURce]:RADio:GSM:SLOT0:NORMal:ENCRyption:BCH1:BCC?
```

This command sets the broadcast control code (BCC) which is used to indicate what training sequence is being used by the basestation in the forward channels. This code will allow the mobile station to decode the other channels in the broadcast channel.

***RST** 0

Range 0–7

:SLOT0:NORMal:ENCRyption:BCH1:CELLid

Supported E4438C with Option 416

```
[:SOURce]:RADio:GSM:SLOT0:NORMal:ENCRyption:BCH1:CELLid <val>
[:SOURce]:RADio:GSM:SLOT0:NORMal:ENCRyption:BCH1:CELLid?
```

This command sets the cell identification. This will identify a cell within a location area.

***RST** 0

Range 0–65535

:SLOT0:NORMal:ENCRyption:BCH1:LAC

Supported E4438C with Option 416

```
[:SOURce]:RADio:GSM:SLOT0:NORMal:ENCRyption:BCH1:LAC <val>
[:SOURce]:RADio:GSM:SLOT0:NORMal:ENCRyption:BCH1:LAC?
```

This command sets the location area code (LAC). The location area code provides 16 bits to allow the administrator to define a location.

***RST** 0

Range 0–65535

:SLOT0:NORMal:ENCRyption:BCH1:MCC

Supported E4438C with Option 416

```
[:SOURce]:RADio:GSM:SLOT0:NORMal:ENCRyption:BCH1:MCC <val>
[:SOURce]:RADio:GSM:SLOT0:NORMal:ENCRyption:BCH1:MCC?
```

This command sets the mobile country code (MCC). The mobile country code is a 12 bit number used to represent the country where the basestation is located.

***RST** 0

Range 0–4095

:SLOT0:NORMal:ENCRyption:BCH1:MNC

Supported E4438C with Option 416

```
[:SOURce]:RADio:GSM:SLOT0:NORMal:ENCRyption:BCH1:MNC <val>
[:SOURce]:RADio:GSM:SLOT0:NORMal:ENCRyption:BCH1:MNC?
```

This command sets the mobile network code (MNC). The mobile network code is the individual number a network will be assigned.

***RST** 0

Range 0–255

Remarks Federal regulation mandates that a 3-digit MNC will be used. For the ESG implementation the upper four bits are set to 1111.

:SLOT0:NORMal:ENCRyption:BCH1:PLMN

Supported E4438C with Option 416

```
[:SOURce]:RADio:GSM:SLOT0:NORMal:ENCRyption:BCH1:PLMN <val>
[:SOURce]:RADio:GSM:SLOT0:NORMal:ENCRyption:BCH1:PLMN?
```

This command is used to set the Public Land Mobile Network (PLMN) which is used to indicate the country the phone is in. PLMN is also referred to as the National Country Code (NCC).

***RST** 0

Range 0–7

:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:CS1:DATA

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:CS1:DATA
PN9|PN15
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:CS1:DATA?
```

This command sets the bit pattern for the CS1 packet data traffic channel.

***RST** PN9

Key Entry **PN9** **PN15**

:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:CS4:DATA

Supported E4438C with Option 402

```
[:SOURce]:RADio[1]|2|3|4:GSM:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:CS4
:DATA PN9|PN15
[:SOURce]:RADio[1]|2|3|4:GSM:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:CS4
:DATA?
```

This command selects the encryption field data, if the selected timeslot uses the packet data block type 4 coding scheme.

***RST** PN9

Key Entry **PN9** **PN15**

Remarks Refer to "SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption" on page 800 for selecting the coding scheme.

:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:DLINk:MCS1:DATA

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:DLINk:MCS1:
DATA PN9|PN15
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:DLINk:MCS1:
DATA?
```

This command sets the bit pattern for the downlink MCS1 packet data traffic channel.

***RST** PN9

Key Entry **PN9** **PN15**

:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:FIX4 <val>
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected normal timeslot encryption field.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type.

:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:TCH:FS:DATA

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:TCH:FS:DATA
PN9|PN15
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:TCH:FS:DATA?
```

This command sets the bit pattern for the TCH/FS channel.

***RST** PN9

Key Entry **PN9** **PN15**

:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:ULINk:MCS1:DATA

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:ULINk:MCS1:
DATA PN9|PN15
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:NORMal:ENCRyption:ULINk:MCS1:
DATA?
```

This command sets the bit pattern for the uplink MCS1 packet data traffic channel.

***RST** PN9

Key Entry **PN9** **PN15**

:SLOT0|[1]|2|3|4|5|6|7:NORMal:STEal

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:NORMal:STEal <val>
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:NORMal:STEal?
```

This command specifies the normal stealing bits for the selected timeslot. The single bit defines the value for both 1-bit fields.

***RST** #H0

Range #H0–#H1

Key Entry **S**

:SLOT0|[1]|2|3|4|5|6|7:NORMal:TSEQuence

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:NORMal:TSEQuence
TSC0|TSC1|TSC2|TSC3|TSC4|TSC5|TSC6|TSC7|<bit_pattern>
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:NORMal:TSEQuence?
```

This command changes the 26-bit training sequence (TS) for a normal timeslot. The preset hexadecimal value (when normal preset is selected) for TS reflects the GSM protocol, however you can enter a new value by using this command. The hexadecimal values for the 8 training sequence codes are listed below:

***RST** #H0000000

Range <bit_pattern>: #H0–#H3FFFFFF

Key Entry **TSC0** **TSC1** **TSC2** **TSC3** **TSC4** **TSC5** **TSC6** **TSC7**

Custom TS

Remarks The preset hexadecimal value (when normal preset is selected) for TS reflects the GSM protocol, however you can enter a new value by using this command.

:SLOT0|[1]|2|3|4|5|6|7:POWer

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:POWer MAIN|DELTa
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:POWer?
```

This command defines the RF output power level for the selected timeslot.

MAIN This choice specifies RF output as the main power level.

DELTa This choice specifies RF output as the alternative power level.

***RST** MAIN

Key Entry **Timeslot Ampl Main Delta**

:SLOT0|[1]|2|3|4|5|6|7:STATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:STATe ON|OFF|1|0
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:STATe?
```

This command enables or disables the operating state of the selected timeslot.

***RST** Timeslot 0: 1 Timeslot 1–7: 0

Key Entry **Timeslot Off On**

:SLOT0|[1]|2|3|4|5|6|7:SYNC:ENCRyption

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:SYNC:ENCRyption PN9|PN11|PN15|
PN20|PN23|FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:SYNC:ENCRyption?
```

This command creates and configures an encrypted data field for a synchronization timeslot.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1’s & 4 0’s **8 1’s & 8 0’s** **16 1’s & 16 0’s** **32 1’s & 32 0’s**

64 1’s & 64 0’s

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:SLOT0|[1]|2|3|4|5|6|7:SYNC:ENCRyption:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:SYNC:ENCRyption:FIX4 <val>
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:SYNC:ENCRyption:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected synchronization timeslot encryption field.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks `FIX4` must already be defined as the data type.

:SLOT0|[1]|2|3|4|5|6|7:SYNC:TSEQuence

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:SYNC:TSEQuence <bit_pattern>
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7:SYNC:TSEQuence?
```

This command customizes the training sequence (TS) for the selected synchronization timeslot. The preset hexadecimal value (when normal preset is selected) for TS reflects the GSM protocol, however you can enter a new value by using this command.

***RST** #HB962040F2D45761B

Range #H0–#HFFFFFFFFFFFFFFFF

Key Entry **TS**

:SLOT0|[1]|2|3|4|5|6|7[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7[:TYPE] CUSTom|NORMal|
FCORrection|SYNC|DUMMy|ACCess|NORMAL_ALL
[:SOURce]:RADio:GSM:SLOT0|[1]|2|3|4|5|6|7[:TYPE]?
```

This command sets the timeslot type for the selected timeslot.

***RST** NORMAL

Key Entry **Custom** **Normal** **FCorr** **Sync** **Dummy** **Access** **Normal All**

:SOUT

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SOUT FRAME|SLOT|ALL
[:SOURce]:RADio:GSM:SOUT?
```

This command sets the synchronization location (within the pattern of data) and the type of output at the EVENT 1 rear panel connector.

FRAME This choice outputs a 1-bit signal, synchronized to the bit selected by the synchronization output offset command, for a framed data pattern.

SLOT This choice outputs a 1-bit signal, synchronized to the bit selected by the synchronization output offset command, for a selected timeslot.

ALL This choice outputs a 1-bit signal, synchronized to the bit selected by the synchronization output offset command, for all active timeslots.

***RST** FRAME

Key Entry **Begin Frame** **Begin Timeslot #** **All Timeslots**

:SOUT:OFFSet

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SOUT:OFFSet <val>
[:SOURce]:RADio:GSM:SOUT:OFFSet?
```

This command sets the offset value for the location of the output synchronization signal on the EVENT1 rear panel connector relative to the beginning of the framed data pattern or timeslot.

The variable `<val>` is expressed as a number of bits.

***RST** +0

Range –155 to 155

Key Entry **Sync Out Offset**

Remarks Negative values move the synchronization output signal earlier; positive values move it later.

To change the output of the EVENT1 rear panel connector to SLOT, refer to ":SOUT" on page 809.

:SOUT:SLOT

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SOUT:SLOT <val>
[:SOURce]:RADio:GSM:SOUT:SLOT?
```

This command selects the timeslot that will trigger a 1-bit output signal at the EVENT 1 rear panel connector.

***RST** +0

Range 0–7

Key Entry **Begin Timeslot #**

Remarks To change the output of the EVENT1 rear panel connector to SLOT, refer to ":SOUT" on page 809.

:SRATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:SRATe <val>
[:SOURce]:RADio:GSM:SRATE?
```

This command sets the transmission symbol rate. Symbol rate is the bit rate divided by the bits per symbol. A change in the symbol rate affects the bit rate. Refer to ":BRATe" on page 780 for information on bit rate.

The variable `<val>` is expressed in units of symbols per second (sps–Msps) and the maximum symbol rate depends on the filter. Refer to ":FILTer" on page 792 for minimum filter symbol width.

NOTE When using multiframe, limit the symbol rate to no more than 271 ksps. Although higher rates may work, they are not supported.

The filter may have to be truncated down to 32 or 16 symbols wide to achieve the highest symbol rate. The signal generator's internal filters are not truncated below their minimum filter length and user-defined FIR filters are not truncated. If the filter cannot be truncated then the symbol rate is limited to the maximum rate of the narrowest filter size possible.

The relative timing of the modulated data, as well as the actual filter response is affected when the filter is truncated.

When the symbol rate changes, the ESG reconfigures the baseband generator. The time required to reconfigure the baseband generator is inversely proportional to the symbol rate: lower symbol rates require more time.

To change the modulation type, refer to “:MODulation[:TYPE]” on page 795.

***RST** +2.70833333E+006

Range

Modulation Type	**Symbol Rate Range**		
	16 Symbol Wide Filter	*32 Symbol Wide Filter*	*64 Symbol Wide Filter*
BPSK, FSK2, MSK	1sps–50Msps	1sps–25Msps	1sps–12.5Msps
C4FM, OQPSK, FSK4	2sps–25Msps	2sps–12.5Msps	2sps–6.25Msps
OQPSKI95, QPSK			
P4QPPSK, QPSKIS95			
GRAYQPSK, QAM4			
D8PSK, EDGE, FSK8, PSK8	3sps–16.666666666 Msps	3sps–8.333333333 Msps	3sps–4.166666666Msps
FSK16, PSK16, QAM16	4sps–12.5Msps	4sps–6.25Msps	4sps–3.125Msps
QAM32	5sps–10Msps	5sps–5Msps	5sps–2.5Msps
QAM64	6sps–8.333333333 Msps	6sps–4.166666666 Msps	6sps–2.083333333 Msps
QAM128	7sps–7.142857142 Msps	7sps–3.571428572 Msps	7sps–1.785714285 Msps
QAM256	8sps–6.25Msps	8sps–3.125 Msps	8sps–1.5625 Msps

NOTE Using I/Q skew will half the minimum number of symbols for the selected filter.

Key Entry **Symbol Rate**

:TRIGger:EXTernal:DELay

Supported E4438C with Option 416

```
[:SOURce]:RADio:GSM:TRIGger:EXTernal:DELay <val>
[:SOURce]:RADio:GSM:TRIGger:EXTernal:DELay?
```

This command sets the trigger delay for synchronizing the ESG. The variable `<val>` is expressed in number of symbols.

***RST** +0

Range 0–1048575

:TRIGger:TYPE

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:TRIGger:TYPE CONTinuous|SINGle|GATE
[:SOURce]:RADio:GSM:TRIGger:TYPE?
```

This command sets the trigger type.

CONTinuous The framed data sequence repeats continuously; the sequence restarts every time the previous playback is completed. To customize continuous triggering, refer to ":TRIGger:TYPE:CONTinuous[:TYPE]" on page 812.

SINGle The framed data sequence plays once for every trigger received.

GATE An external trigger signal interrupts the playback while the gating signal is in the inactive state. Playback resumes when the external control signal returns to the active state. The active state can be set to high or low.

***RST** CONT

Key Entry **Continuous** **Single** **Gated**

:TRIGger:TYPE:CONTinuous[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:TRIGger:TYPE:CONTinuous[:TYPE] FREE|TRIGger|RESet
[:SOURce]:RADio:GSM:TRIGger:TYPE:CONTinuous[:TYPE]?
```

This commands selects the waveform's response to a trigger signal while using the continuous trigger mode. See ":TRIGger:TYPE" on page 812 for more information on triggering modes.

The following list describes the waveform's response to each of the command choices:

FREE Turning the ARB format on immediately triggers the waveform. The waveform repeats until the format is turned off or another trigger or waveform is selected.

TRIGger The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously until you turn the format off, select another trigger, or choose another waveform file.

RESet The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously. Subsequent triggers reset the waveform to the beginning. For a waveform sequence, this means to the beginning of the first segment in the sequence.

***RST** FREE

Key Entry **Free Run** **Trigger & Run** **Reset & Run**

:TRIGger:TYPE:GATE:ACTive

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:TRIGger:TYPE:GATE:ACTive LOW|HIGH
[:SOURce]:RADio:GSM:TRIGger:TYPE:GATE:ACTive?
```

This command selects the active state (gate polarity) of the gate while using the gating trigger mode.

The LOW and HIGH selections correspond to the low and high states of an external trigger signal. For example, when you select HIGH, the active state occurs during the high of the trigger signal. When the active state occurs, the ESG stops the waveform playback at the last played sample point, then restarts the playback at the next sample point when the inactive state occurs. For more information on triggering and to select gating as the trigger mode, see ":TRIGger:TYPE" on page 812.

The following list describes the signal generator's gating behavior for the external trigger signal polarity selections:

LOW The waveform playback stops when the trigger signal goes low (active state) and restarts when the trigger signal goes high (inactive state).

HIGH The waveform playback stops when the trigger signal goes high (active state) and restarts when the trigger signal goes low (inactive state).

***RST** HIGH

Key Entry **Gate Active Low High**

:TRIGger[:SOURce]

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:TRIGger[:SOURce] KEY|EXT|BUS
[:SOURce]:RADio:GSM:TRIGger[:SOURce]?
```

This command sets the trigger source.

For more information on triggering, see ":TRIGger:TYPE" on page 812. The following list describes the command choices:

KEY This choice enables manual triggering by pressing the front-panel **Trigger** hardkey.

EXT An externally applied signal triggers the waveform. This is the only choice that works with gating. The following conditions affect an external trigger:

- The input connector selected for the trigger signal. You have a choice between the rear-panel PATTERN TRIG IN connector or the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector. To make the connector selection, see ":TRIGger[:SOURce]:EXTernal[:SOURce]" on page 816.

For more information on the connectors and on connecting the cables, see the *E4428C/38C ESG Signal Generators User's Guide*.

- The trigger signal polarity:
  - gating mode, see ":TRIGger:TYPE:GATE:ACTive" on page 813
  - continuous and single modes, see ":TRIGger[:SOURce]:EXTernal:SLOPe" on page 815
- The time delay between when the ESG receives a trigger and when the waveform responds to the trigger. There are two parts to setting the delay:
  - setting the amount of delay, see ":TRIGger[:SOURce]:EXTernal:DELay" on page 814
  - turning the delay on, see ":TRIGger[:SOURce]:EXTernal:DELay:STATe" on page 815

BUS — This choice enables triggering over the GPIB or LAN using the `*TRG` or `GET` commands or the AUXILIARY INTERFACE (RS-232) using the `*TRG` command.

***RST** KEY

Key Entry **Trigger Key** **Ext** **Bus**

:TRIGger[:SOURce]:EXTernal:DELay

Supported E4438C with Option 402

This command sets the number of bits to delay the signal generator's response to an external trigger.

The bit delay is a delay between when the ESG receives the trigger and when it responds to the trigger. The delay uses the clocks of the bit-clock to time the delay. After the ESG receives the trigger and the set number of delay bits (clocks) occurs, the ESG transmits the data pattern.

The delay occurs after you enable the state. See ":TRIGger[:SOURce]:EXTernal:DELay:STATe" on page 815. You can set the number of bits either before or after enabling the state.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 813.

***RST** +0

Range 0–1048575

Key Entry **Ext Delay Bits**

:TRIGger[:SOURce]:EXTernal:DELay:FINe

Supported E4438C with Option 416

```
[:SOURce]:RADio:GSM:TRIGger[:SOURce]:EXTernal:DELay:FINe <val>
[:SOURce]:RADio:GSM:TRIGger[:SOURce]:EXTernal:DELay:FINe?
```

This command sets the fine trigger delay for synchronizing the ESG.

The fine delay value is added to the coarse delay setting (see ":TRIGger[:SOURce]:EXTernal:DELay" on page 814).

The variable `<val>` is expressed as a fraction of one symbol.

***RST** +0.00000000E+000

Range 0–1

:TRIGger[:SOURce]:EXTernal:DELay:STATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:TRIGger[:SOURce]:EXTernal:DELay:STATe ON|OFF|1|0
[:SOURce]:RADio:GSM:TRIGger[:SOURce]:EXTernal:DELay:STATe?
```

This command enables or disables the operating state of the external trigger delay function.

For setting the delay time, see ":TRIGger[:SOURce]:EXTernal:DELay" on page 814, and for more information on configuring an external source, see":TRIGger[:SOURce]" on page 813.

***RST** 0

Key Entry **Ext Delay Off On**

:TRIGger[:SOURce]:EXTernal:SLOPe

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:TRIGger[:SOURce]:EXTernal:SLOPe POSitive|NEGative
[:SOURce]:RADio:GSM:TRIGger[:SOURce]:EXTernal:SLOPe?
```

This command sets the polarity for an external trigger signal while using the continuous, single triggering mode. To set the polarity for gating, see ":TRIGger:TYPE:GATE:ACTive" on page 813.

The POSitive and NEGative selections correspond to the high (positive) and low (negative) states of the external trigger signal. For example, when you select POSitive, the waveform responds (plays) during the high state of the trigger signal. When the ESG receives multiple trigger occurrences when only one is required, the signal generator uses the first trigger and ignores the rest.

For more information on configuring an external trigger source and to select external as the trigger source, see “:TRIGger[:SOURce]” on page 813.

***RST** NEG

Key Entry **Ext Polarity Neg Pos**

:TRIGger[:SOURce]:EXTernal[:SOURce]

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM:TRIGger[:SOURce]:EXTernal[:SOURce] EPT1|
EPT2|EPTRIGGER1|EPTRIGGER2
[:SOURce]:RADio:GSM:TRIGger[:SOURce]:EXTernal[:SOURce]?
```

This command selects which PATTERN TRIG IN connection the ESG uses to accept an externally applied trigger signal when external is the trigger source selection.

For more information on configuring an external trigger source and to select external as the trigger source, see “:TRIGger[:SOURce]” on page 813. For more information on the rear-panel connectors, see the *E4428C/38C ESG Signal Generators User’s Guide*.

The following list describes the command choices:

EPT1 This choice is synonymous with EPTRIGGER1 and selects the PATTERN TRIG IN rear-panel connector.

EPT2 This choice is synonymous with EPTRIGGER2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.

EPTRIGGER1 This choice is synonymous with EPT1 and selects the PATTERN TRIG IN rear-panel connector.

EPTRIGGER2 This choice is synonymous with EPT2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.

***RST** EPT1

Key Entry **Patt Trig In 1** **Patt Trig In 2**

[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:GSM[:STATe] ON|OFF|1|0
[:SOURce]:RADio:GSM[:STATe]?
```

This command enables or disables the GSM modulation format.

***RST** 0

Key Entry **GSM Off On**

Remarks Although the GSM modulation is enabled with this command, the RF carrier is not modulated unless you also activate the front panel **Mod On/Off** hardkey.

HSDPA over W-CDMA Subsystem–Option 418 ([:SOURce]:RADio:WCDMa:HSDPa[:BBG])

The commands in this subsystem support the remote functionality of the Signal Studio for HSDPA over W-CDMA software. For a complete description of terms and HSDPA functionality, refer to the software online help. Commands used for configuring the carrier signal and performing general signal generator functions are located in different SCPI command subsystems found within the SCPI Command Reference volumes.

There are two methods to determine the SCPI commands for a setup. One method is to locate each individual command listed in this subsystem and others within the *SCPI Command Reference* volumes. The other method is to use the HSDPA software UI. After downloading a UI setup to the ESG, the software lets you export a SCPI file that contains the commands used in the UI setup. Refer to the HSDPA software online help for information on this feature.

File Overview

The ESG's memory catalog (signal generator memory) uses several file types, each assigned with a unique syntax to recall the file. This section provides information on using files with SCPI commands.

This subsystem uses the following two command variables to represent two different file types stored in signal generator memory:

`"<file name>"` Bit file

`"<user FIR>"` FIR file

For more information on managing and using files, refer to the resources in the following list:

- "File Name Variables" on page 13 for information on the file name syntax
- Table 1-4 on page 14 for a listing of the different file types
- *E4428C/38C ESG Signal Generators Programming Guide* for information on downloading bit files
- *E4428C/38C ESG Signal Generators User's Guide* for information on creating and editing bit and FIR files using the signal generator

NOTE To create or edit HSDPA files with the ESG, use the table editors located in the Real Time W-CDMA modulation format. Access the bit table editor through the `Data` field and then select **User File** as the data source. Access the FIR filter table editor through the `Filter` field and then select **Define User FIR** as the filter type.

The HSDPA software interface downloads user files (bit and FIR file types) to the ESG when **USER** is the software data or filter type selection. You can see these files on the ESG by pressing **Utility** > **Memory Catalog** > **Catalog Type** and then selecting the file type, or by using the SCPI commands located in the Memory subsystem. User files are located on the ESG in the following directory path: /USER/<file type directory>/<file name>. Table 9-2 shows the software naming convention for the different files created by the HSDPA software.

Table 9-2 HSDPA Software Downloaded File Names

Link Direction	Data Source	File Name	ESG File Type
Downlink and Uplink	Filter	<project name>–FIR	FIR
Downlink	BCH	<project name>–BCH	Bit
	PICH	<project name>–PICH	
	DPCH	<project name>–DPCH	
	DCHx[a]	<project name>–DCHx[a]	
	Inter-TTI	<project name>–ITTIx[b]	
	HARQ ACK/NACK Pattern	<project name>–DLCPT	
	AMC CQI Pattern	<project name>–DLAPT	
	HS-DSCH	<project name>–DSCH1	
	HS-PDSCH	<project name>–HSPDx[b]	
	HS-SCCH	<project name>–HSSCCx[b]	
Uplink	DPCCH	<project name>–DPCCH	
	FBI	<project name>–FBI	
	TPC	<project name>–TPC	
	DPDCH	<project name>–DPDCH	
	DCHx[a]	<project name>–DCHx[a]	
	ACK Pattern	<project name>–APAT	
	CQI Pattern	<project name>–CPAT	

a. x is the DCH number (1–6).
b. x is the channel number (1–4) for the HSDPA, the HS-PDSCH and the HS-SCCH.

Managing ESG Setting Conflicts and Error Messages

The ESG reports setting conflicts as error messages. When a setting conflict occurs, an error number and a brief message appear at the bottom of the ESG display. You can view the full text of the error message in either of two ways: by using the front panel of the ESG, or by executing SCPI commands.

Front Panel	Press **Utility** > **Error Info**.
SCPI	Execute the SCPI error commands described in the "System Subsystem (:SYSTem)" on page 154.

For more information on Error messages, refer to the *E4428C/38C ESG Signal Generators Programming Guide* for remote viewing or the *E4428C/38C ESG Signal Generators User's Guide* for front panel viewing.

:DLINk:APPLy

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:APPLy
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:APPLy?
```

This command applies changes to the channel setup and data for active downlink physical and transport channels, immediately starting the channel coding generation process. A progress bar may appear on the ESG display indicating that the new signal parameters are being applied. Signal parameters are also applied when the HSDPA modulation format is turned on.

Use the query to determine whether or not execution of this command is required. It returns the following responses:

0	Command execution is not required.
1	Command execution is required.

NOTE The apply query response is valid only when downlink HSDPA format is active.

The apply function will not work if there is a conflict with range values and coupled parameters. For example, if all the physical channel codes are not orthogonal to each other, the new settings are not applied to the signal when this command is executed. Resolve any conflicts before reapplying the changes. The ESG reports an error when conflicts occur.

:DLINk:AWGN:CN

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:AWGN:CN <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:AWGN:CN?
```

This command sets the downlink in-band carrier to noise ratio (C/N) value using AWGN.

***RST** 0

Range –30 to 30

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:AWGN[:STATe]

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:AWGN[:STATe] ON|OFF|0|1
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:AWGN[:STATe]?
```

This command turns the downlink AWGN on or off.

***RST** 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:BBCLock[:SOURce]

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:BBCLock[:SOURce] INT|EXT
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:BBCLock[:SOURce]?
```

This command selects the downlink baseband generator chip clock source, which is either internal to the signal generator or applied externally.

***RST** INT

Remarks When using an external chip clock source, connect the signal to the DATA CLOCK connector on the front panel of the ESG.

:DLINk:CPICh:CCODe

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:CPICh:CCODe?
```

This query returns the CPICH channelization code, which is always set to zero.

:DLINk:CPICh:POWer

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:CPICh:POWer <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:CPICh:POWer?
```

This command sets the CPICH power level. The variable `<val>` is expressed in decibels (dB).

***RST** 3.30000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:CPICh[:STATe]

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:CPICh[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:CPICh[:STATe]?
```

This command turns the CPICH on or off.

***RST** 1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:DPCH:CCODe

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:CCODe <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:CCODe?
```

This command sets the downlink DPCH channel code number.

***RST** 10

Range 0–511

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

The channel code is coupled with the slot format and all other physical channel codes. Set the channel code to not exceed limits of the slot format and ensure that all physical channel codes are orthogonal to each other. If any channel codes fail to meet this criteria, the apply function (downlink apply command) will not work.

:DLINk:DPCH:DATA

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DATA PN9|PN15|FIX4|DCH|
"<file name>"
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DATA?
```

This command configures the downlink DPCH data pattern.

DCH This selects the transport channel as the data source. The DCH selection is not available for a DPCH slot format of 16.

"<file name>" This represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (downlink apply command) will not work. Refer to "File Overview" on page 818 for more information on files.

***RST** PN9

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:DPCH:DATA:FIX4

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DATA:FIX4 <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DATA:FIX4?
```

This command sets the downlink DPCH repeating 4-bit binary data pattern.

The variable `<val>` accepts values in binary, hexadecimal, or decimal format, however the query returns only binary values.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:DPCH:DCH[1]|2|3|4|5|6:BSIZe

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6
:BSIZe <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:BSIZe?
```

This command sets the block size for the selected downlink DCH.

***RST** 20

Range 0–5000

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

The number of data bits per DCH cannot exceed 200,000. To maintain this data bit limit, the ESG calculates the product of the block size and the number of blocks. If the product of these two parameters exceeds 200,000, the apply function (downlink apply command) will not work.

:DLINk:DPCH:DCH[1]|2|3|4|5|6:CTYPe

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6
:CTYPe HCONv|TCONv|TURBo|NONE
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:CTYPe?
```

This command sets the coder type for the selected downlink DCH.

HCONv This choice selects the 1/2 rate convolutional encoder.

TCONv This choice selects the 1/3 rate convolutional encoder.

TURBo This choice selects the turbo coder.

NONE This choice selects no coding.

***RST** HCON

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:DPCH:DCH[1]|2|3|4|5|6:CRC

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:CRC 0|8|
12|16|24
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:CRC?
```

This command sets the number of CRC bits for the selected downlink DCH.

***RST** 8

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:DPCH:DCH[1]|2|3|4|5|6:DATA

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:DATA PN9|
PN15|FIX4|"<file name>"
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:DATA?
```

This command configures the data for the selected downlink DCH.

`"<file name>"` This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (downlink apply command) will not work. Refer to "File Overview" on page 818 for more information on files.

***RST** PN9

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:DPCH:DCH[1]|2|3|4|5|6:DATA:FIX4

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:DATA:
FIX4 <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:DATA:FIX4?
```

This command sets the repeating 4-bit binary data pattern for the selected downlink DCH.

The variable `<val>` accepts values in binary, hexadecimal, or decimal format, however the query returns only binary values.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:DPCH:DCH[1]|2|3|4|5|6:NBLocks

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:
NBLocks <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:NBLocks?
```

This command sets the number of data blocks for the selected downlink DCH.

***RST** 1

Range 0–512

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

The number of data bits per DCH cannot exceed 200,000. To maintain this data bit limit, the ESG calculates the product of the block size and the number of blocks. If the product of these two parameters exceeds 200,000, the apply function (downlink apply command) will not work.

:DLINk:DPCH:DCH[1]|2|3|4|5|6:RMATtribute

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:
RMATtribute <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:
RMATtribute?
```

This command sets the rate matching attribute for the selected downlink DCH.

***RST** 1

Range 1–256

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:DPCH:DCH[1]|2|3|4|5|6:TTI

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:TTI 10|20|
40|80
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DCH[1]|2|3|4|5|6:TTI?
```

This command sets the TTI for the selected downlink DCH.

The choices are expressed in millisecond (ms).

***RST** 10

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:DPCH:DCH2|3|4|5|6[:STATe]

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DCH2|3|4|5|6[:STATe] ON|
OFF|1|0
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:DCH2|3|4|5|6[:STATe]?
```

This command turns the selected downlink DCH on or off; DCH1 is always on.

***RST** DCH 1: 1 DCH 2–6: 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

The apply command will not work and the ESG will report an error if you turn on a DCH where lower numbered DCHs are off. For example, turning on DCH5 requires turning on DCH2–4. The reverse is true when turning off the DCHs.

:DLINk:DPCH:POWer

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:POWer <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:POWer?
```

This command sets the downlink DPCH power level.

***RST** –1.02000000E+001

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:DPCH:SFORmat

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:SFORmat <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:SFORmat?
```

This command configures the downlink DPCH slot format.

***RST** 0

Range 0–16

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

The slot format is coupled with the channel code, so a change in one value may require a change in the other. If the channel code exceeds the limits of the slot format or if it is not orthogonal with all other physical channel codes, the apply function (downlink apply command) will not work.

:DLINk:DPCH:SSCOffset

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:SSCOffset <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:SSCOffset?
```

This command sets the downlink DPCH secondary scrambling code offset.

***RST** +0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:DPCH:TFCI

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:TFCI <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:TFCI?
```

This command sets the TFCI 10-bit pattern for the downlink DPCH.

The variable `<val>` accepts values in binary, hexadecimal, or decimal format, however the query returns only binary values.

***RST** +0

Range 0–1023

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

Setting the TFCI bits is optional; they describe the type of service in use, for example voice or data.

:DLINk:DPCH:TOFFset

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:TOFFset <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:TOFFset?
```

This command adjusts the downlink DPCH timing offset.

The variable `<val>` is expressed in chips.

***RST** +0

Range 0–149

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:DPCH:TPC:NSTeps

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:TPC:NSTeps <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:TPC:NSTeps?
```

This command sets the number of steps for the down and up (DUP) or up and down (UDOWn) TPC pattern selections.

***RST** +1

Range 1–80

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:DPCH:TPC:PATTern

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:TPC:PATTern UDOWn|DUP|UALL|
DALL|"<file name>"
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:TPC:PATTern?
```

This command configures the downlink DPCH TPC pattern for increasing or decreasing, or increasing and decreasing the UE power level.

UDOWn	The TPC pattern repetitively steps up and down.
DUP	The TPC pattern repetitively steps down and up.
UALL	The TPC pattern consecutively steps up.
DALL	The TPC pattern consecutively steps down.
"<file name>"	This variable represents a TPC pattern file stored in signal generator memory. The pattern must contain at least one bit or the apply function (downlink apply command) will not work. Refer to "File Overview" on page 818 for more information on files.

***RST** UDOW

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

Each step in a TPC pattern signals an increase or decrease of 1 dB in the UE output power level.

:DLINk:DPCH:TRPosition

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH:TRPosition?
```

This query returns the downlink DPCH transport channel position that is always set to FIX.

:DLINk:DPCH[:STATe]

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:DPCH[:STATe]?
```

This command turns the downlink DPCH on or off.

***RST** 1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:FILTer

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:FILTer RNYQuist|NYQuist|
GAUSsian|RECTangle|IS95|IS95_EQ|IS95_MOD|IS95_MOD_EQ|AC4Fm|UGGaussian|
"<user FIR>"
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:FILTer?
```

This command selects the downlink filter type.

IS95	This filter meets the criteria of the IS-95 standard.
IS95_EQ	This filter is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard and is best suited for IS-95 baseband filtering.
IS95_MOD	This filter meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.
IS95_MOD_EQ	This filter is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance), with lower passband rejection.
UGGaussian	This is a GSM Gaussian filter with a fixed BbT value of 0.300.
AC4Fm	This is a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.

`"<user FIR>"`	This variable represents any FIR filter file stored in signal generator memory. Refer to "File Overview" on page 818 for more information on files.
***RST**	RNYQ
Remarks	Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:FILTer:ALPHa

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:FILTer:ALPHa <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:FILTer:ALPHa?
```

This command sets the downlink Nyquist or root Nyquist filter alpha value.

***RST** +2.20000000E–001

Range 0–1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

Executing this command while a filter other than Nyquist or root Nyquist is selected changes the parameter value, but it is not used by the signal generator until one of the Nyquist filters is selected.

:DLINk:FILTer:BBT

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:FILTer:BBT <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:FILTer:BBT?
```

This command sets the downlink Gaussian filter BbT value.

***RST** +5.00000000E–001

Range 0–1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

Executing this command while a filter other than the Gaussian filter is selected changes the parameter value, but it is not used by the signal generator until the Gaussian filter is selected.

:DLINk:FILTer:CHANnel

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:FILTer:CHANnel EVM|ACP
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:FILTer:CHANnel?
```

Execute this command to optimize a downlink filter for minimized EVM or for minimized ACP.

EVM This choice provides the most ideal passband

ACP This choice improves stopband rejection for the root Nyquist and Nyquist filters.

***RST** EVM

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

To change the filter selection, refer to ":DLINk:FILTer" on page 831.

:DLINk:HSBurst

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSBurst ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSBurst?
```

This command sets the handling of the off slot periods for the downlink HSDPA channels.

ON|1 This choice turns off the ESG ALC feature and uses DTX during the off slots.

OFF|0 This choice continuously transmits the HSDPA channels filling the off slots with dummy bits.

***RST** 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:HSDPa:AMC:CQIMapping:UECategory

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:AMC:CQIMapping:
UECategory <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:AMC:CQIMapping:UECategory?
```

This command sets the UE category that determines the CQI mapping table per the 3GPP standards.

***RST** 5

Range 1–12

Remarks To use this command's parameter in a setup, you must also set AMC as the feedback selection. Refer to the ":DLINk:HSDPa:FCONtrol" on page 835 for selecting the feedback type.

Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:HSDPa:AMC:CPATtern

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:AMC:CPATtern ALL_1|ALL_2|
ALL_3|ALL_4|ALL_5|ALL_6|ALL_7|ALL_8|ALL_9|ALL_10|ALL_11|ALL_12|ALL_13|
ALL_14|ALL_15|ALL_16|ALL_17|ALL_18|ALL_19|ALL_20|ALL_21|ALL_22|ALL_23|
ALL_24|ALL_25|ALL_26|ALL_27|ALL_28|ALL_29|ALL_30|"<file_name>"
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:AMC:CPATtern?
```

This command sets a simulated UE CQI pattern that determines HSDPA1's response including the modulation type (QPSK or 16QAM) and the constellation version for 16QAM per the set UE category.

`ALL_<val>` These choices configure a simulated UE ACK response with a single CQI value for 1,280 subframes.

`"<file name>"` This variable represents a CQI pattern file stored in signal generator memory. Create this file either by using the AMC CQI pattern Data Type Entry window and downloading the file to the ESG, or by using the ESG Real Time W-CDMA table editor to create a bit file with the following bit patterns:

- CQI value of 1–30 using an 8-bit pattern, 00000001 to 00011110
- DTX is represented by 11111111

In the file, do not use delimiters between subframes; enter subframe bits as a binary string.

When creating a pattern, you can determine the number of active subframes from 1 to 1,280. The subframes are numbered 0 to 1,279. A subframe is active when it contains 8-bits. If a subframe contains at least 1-bit but less than 8-bits, the apply function (downlink apply command) will not work.

***RST** ALL_21

Remarks To use this command's parameter in a setup, you must also set AMC as the feedback selection. Refer to the ":DLINk:HSDPa:FCONtrol" for selecting the feedback type.

Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:HSDPa:FCONtrol

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:FCONtrol NONE|HARQ|AMC
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:FCONtrol?
```

This command sets the HSDPA1 feedback control type.

NONE This choice turns off the feedback control.

HARQ This choice provides UE feedback using the HARQ process. This selection provides the capability of configuring a simulated UE ACK/NACK response, setting the maximum number of HARQ transmissions, and providing up to eight different RV parameters.

AMC This choice provides UE feedback using adaptive modulation coding. This selection provides the capability of configuring a simulated UE CQI response aligned with a UE category input.

***RST** NONE

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820

:DLINk:HSDPa:HARQ:APATtern

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:HARQ:APATtern ACK_ALL|
"<file name>"
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:HARQ:APATtern?
```

This command sets a simulated UE ACK/NACK pattern that determines HSDPA1's HARQ response.

ACK_ALL This choice configures 1,280 subframes for a simulated ACK only response.

`"<file name>"` This variable represents an ACK pattern file stored in signal generator memory. Create this file either by using the HARQ ACK/NACK pattern Data Type Entry window and download the file to the ESG, or by using the ESG Real Time W-CDMA table editor to create a bit file with the following bit patterns:

- An ACK response is represented by 00.
- A NACK response is represented by 01.
- DTX is represented by 10.

In the file, do not use delimiters between subframes; enter subframe bits as a binary string.

When creating a pattern, you can determine the number of active subframes from 1 to 1,280. The subframes are numbered 0 to 1,279. A subframe is active when it contains 2-bits. If a subframe contains only 1-bit, the apply function (downlink apply command) will not work.

***RST** ACK_ALL

Remarks To use this command's parameter in a setup, you must also set HARQ as the feedback selection. Refer to the “:DLINk:HSDPa:FCONtrol” for selecting the feedback type.

Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 820.

:DLINk:HSDPa:HARQ:MNHTrans

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:HARQ:MNHTrans <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:HARQ:MNHTrans?
```

This command configures the HSDPA1 maximum number of HARQ transmissions for the HARQ function.

Use the command for UE performance testing or for specifying an arbitrary number of HARQ transmissions. When the software encounters a UE NACK response that is set by the HARQ ACK pattern command (see ":DLINk:HSDPa:HARQ:APATtern"), the software re-sends the same packet payload until either the maximum number of HARQ transmissions is reached or a simulated ACK response is encountered. Whenever the software re-sends the same packet payload, it also transmits another RV parameter that is configured by the RV sequence command.

***RST** 1

Range 1–8

Remarks To use this command's parameter in a setup, you must also set HARQ as the feedback selection. Refer to the ":DLINk:HSDPa:FCONtrol" on page 835 for selecting the feedback type.

Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:HSDPa:HARQ:RVSequence[1]|2|3|4|5|6|7|8

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:HARQ:RVSequence[1]|2|3|4|
5|6|7|8 <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:HARQ:RVSequence[1]|2|3|4|
5|6|7|8?
```

This command sets the HSDPA1 RV parameter sequence used with the maximum number of HARQ transmission setting. You can set eight different RV parameters for the RV sequence.

During simulated ACK responses, the software uses the first RV parameter. When the software encounters a simulated NACK response, it sends data using the next RV parameter. The software keeps incrementing to the next RV parameter in the sequence until it receives a simulated ACK response. When the software encounters an ACK response, the RV sequence resets to the first RV parameter.

***RST** 0

Range 0–7

Remarks To use this command's parameter in a setup, you must also set HARQ as the feedback selection. Refer to the ":DLINk:HSDPa:FCONtrol" on page 835 for selecting the feedback type.

Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:HSDPa[1]|2|3|4:BSINfo

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:BSINfo <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:BSINfo?
```

This command sets the HS-DSCH block size. HSDPA1 is the only HSDPA channel configuration that supports the HS-DSCH, however the block size information parameter is also available for HSDPA2–4 for HS-SCCH coding purposes.

***RST** 36

Range 0–63

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:HSDPa[1]|2|3|4:HSPDsch:COFFset

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDsch:
COFFset <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDsch:COFFset?
```

This command sets the HS-PDSCH code offset. The code offset is used in determining the HS-PDSCH channel code.

***RST** HSDPA1: 4 HSDPA2: 8 HSDPA3: 9 HSDPA4: 10

Range 1–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

Set all physical channel codes orthogonal to each other. For any channel codes that fail this criteria, the apply function (downlink apply command) will not work.

:DLINk:HSDPa[1]|2|3|4:HSPDsch:DATA

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDsch:DATA PN9|
FIX4|"<file name>"|DSCH
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDsch:DATA?
```

This command configures the HS-PDSCH data type.

DSCH — This choice is the HS-DSCH selection that is supported on only HSDPA1. Selecting the DSCH choice for HSDPA2–4 will generate an error.

`"<file name>"` — This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (downlink apply command) will not work. Refer to "File Overview" on page 818 for more information on files.

***RST** PN9

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:HSDPa[1]|2|3|4:HSPDSch:DATA:FIX4

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDSch:DATA:
FIX4 <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDSch:DATA:
FIX4?
```

This command sets the HS-PDSCH repeating 4-bit binary data pattern.

The variable `<val>` accepts values in binary, hexadecimal, or decimal format, however the query returns only binary values.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:HSDPa:HSPDsch:DSCH:DATA

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:HSPDsch:DSCH:DATA PN9|
FIX4|"<file name>"
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:HSPDsch:DSCH:DATA?
```

This command defines the HS-DSCH data type for HSDPA1. The HS-DSCH is not supported on HSDPA2–4.

`"<file name>"` — This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (downlink apply command) will not work. Refer to "File Overview" on page 818 for more information on files.

***RST** PN9

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 820.

:DLINk:HSDPa:HSPDSch:DSCH:DATA:FIX4

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:HSPDSch:DSCH:DATA:
FIX4 <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:HSPDSch:DSCH:DATA:FIX4?
```

This command defines the HS-DSCH repeating 4-bit binary data pattern for HSDPA1. The HS-DSCH is not supported on HSDPA2–4.

The variable `<val>` accepts values in binary, hexadecimal, or decimal format, however the query returns only binary values.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 820.

:DLINk:HSDPa:HSPDSch:DSCH:IRBSize

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:HSPDSch:DSCH:IRBSize <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:HSPDSch:DSCH:IRBSize?
```

This command sets the HS-DSCH IR buffer size per the HARQ process for HSDPA1. The HS-DSCH is not supported on HSDPA2–4.

***RST** 9600

Range 960–28800

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 820.

:DLINk:HSDPa:HSPDsch:NCODe

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:HSPDsch:NCODe <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:HSPDsch:NCODe?
```

This command sets number of codes for the HS-PDSCH on HSDPA1. HSDPA2–4 do not support multicodes.

***RST** 1

Range 1–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 820.

Set all physical channel codes so they are orthogonal to each other. If any of the channel codes fail to meet this criteria, the apply function (downlink apply command) will not work.

:DLINk:HSDPa[1]|2|3|4:HSPDsch:POWer

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDsch:
POWer <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDsch:POWer?
```

This command sets the HS-PDSCH power level.

The variable `<val>` is expressed in decibels (dB).

***RST** –1.02000000E+001

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 820.

:DLINk:HSDPa[1]|2|3|4:HSPDsch:SFORmat

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDsch:
SFORmat 0|1
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDsch:SFORmat?
```

This command sets the HS-PDSCH slot format.

0 This sets the modulation type to QPSK.

1 This sets the modulation type to 16QAM.

***RST** 1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:HSDPa[1]|2|3|4:HSPDsch[:STATe]

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:
HSPDsch[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:HSPDsch[:STATe]?
```

This command turns the selected HS-PDSCH on or off.

***RST** HSDPA1: 1 HSDPA2–4: 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

The HS-SCCH must be on for the HS-PDSCH to turn on. Turning off the HS-SCCH also turns off the active HS-PDSCH. See ":DLINk:HSDPa[1]|2|3|4[:STATe]" on page 847 for turning the HS-SCCH on or off.

:DLINk:HSDPa[1]|2|3|4:HSSCch:CCODe

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:HSSCch:
CCODe <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:HSSCch:CCODe?
```

This command sets the HS-SCCH channel code.

***RST** HSDPA1: 4 HSDPA2: 5 HSDPA3: 6 HSDPA4: 7

Range 1–127

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

Set all physical channel codes so they are orthogonal to each other. If any of the channel codes fail to meet this criteria, the apply function (downlink apply command) will not work.

:DLINk:HSDPa[1]|2|3|4:HSSCch:DATA

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:HSSCch:DATA PN9|
FIX4|"<file name>"|STD
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:HSSCch:DATA?
```

This command sets the data type for the selected downlink HS-SCCH.

STD This choice configures the bit field as defined by the 3GPP standards.

"<file name>" This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (downlink apply command) will not work. Refer to "File Overview" on page 818 for more information on files.

***RST** STD

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:HSDPa[1]|2|3|4:HSSCch:DATA:FIX4

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:HSSCch:DATA:
FIX4 <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:HSSCch:DATA:FIX4?
```

This command sets the HS-SCCH repeating 4-bit binary data pattern.

The variable `<val>` accepts values in binary, hexadecimal, or decimal format, however the query returns only binary values.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:HSDPa[1]|2|3|4:HSSCch:POWer

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:HSSCch:
POWer <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:HSSCch:POWer?
```

This command sets the HS-SCCH power level.

The variable `<val>` is expressed in decibels (dB).

***RST** –1.02000000E+001

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:HSDPa[1]|2|3|4:ITTI

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:ITTI <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:ITTI?
```

This command sets the static inter-TTI pattern value for the selected HSDPA.

The variable `<val>` is expressed in subframes (one subframe = 2 ms).

***RST** 8

Range 1–16

Remarks To use a static pattern, select FIX as the choice for the :DLINk:HSDPa[1]|2|3|4:ITTI:PATTern command.

Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:HSDPa[1]|2|3|4:ITTI:PATTern

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:ITTI:
PATTern FIX|"<file name>"
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:ITTI:PATTern?
```

This command selects which method sets the inter-TTI pattern for the selected HSDPA.

FIX This choice enables a static pattern. To configure the pattern, see ":DLINk:HSDPa[1]|2|3|4:ITTI".

`"<file name>"` This variable represents an inter-TTI pattern file stored in signal generator memory. Creating and using a file provides the option of having a flexible inter-TTI pattern where you can vary the distance between HS-PDSCH transmissions. To create a file, use one or a combination of the following methods:

- To create a file internal to the software, use the inter-TTI user pattern editor.
- To create a file external to the software, use a text editor.

  For more information, see the Signal Studio for HSDPA over W-CDMA software online help.

The file name follows the form <project name>–ITTIx, where 'x' is the HSDPA number from one to four. The inter-TTI pattern must contain at least one bit, or the apply function (downlink apply command) will not work.

***RST** FIX

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:HSDPa:NHPRocess

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:NHPRocess <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa:NHPRocess?
```

This command sets the HS-DSCH number of HARQ processes for HSDPA1. For HSDPA2–4, this parameter is fixed at one and is used only for HS-SCCH coding purposes.

***RST** 4

Range 1–8

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:HSDPa[1]|2|3|4:RVParameter

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:RVParameter <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:RVParameter?
```

This command sets the HS-DSCH RV parameter. For HSDPA2–4, which do not support an HS-DSCH, this parameter is used only for HS-SCCH coding purposes.

***RST** 0

Range 0–7

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:HSDPa[1]|2|3|4:UEID

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:UEID <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4:UEID?
```

This command sets the UEID.

***RST** HSDPA1: 0 HSDPA2: 1 HSDPA3: 2 HSDPA4: 3

Range 0–65535

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:HSDPa[1]|2|3|4[:STATe]

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4[:STATe] ON|OFF|
1|0
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:HSDPa[1]|2|3|4[:STATe]?
```

This command turns the selected downlink HSDPA channel on or off.

ON (1)	• Turns on the HS-SCCH for the selected HSDPA. • Enables turning on the HS-PDSCH for the selected HSDPA.
OFF (0)	• Turns off the HS-SCCH for the selected HSDPA. • Turns off the active HS-PDSCH for the selected HSDPA.

***RST** *HSDPA1*: 1 *HSDPA2–4*: 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

Refer to ":DLINk:HSDPa[1]|2|3|4:HSPDsch[:STATe]" on page 842 for turning the HS-PDSCH on or off.

An HSDPA consists of a HS-SCCH and a HS-PDSCH, however the HS-DSCH is supported on only HSDPA1.

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:CCODe

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16:CCODe <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16:CCODe?
```

This command sets the channel code for the selected downlink OCNS.

***RST**	OCNS1: 2	OCNS2: 3	OCNS3: 4	OCNS4: 5
	OCNS5: 6	OCNS6: 7	OCNS7: 8	OCNS8: 9
	OCNS9: 10	OCNS10: 11	OCNS11: 12	OCNS12: 13
	OCNS13: 14	OCNS14: 15	OCNS15: 16	OCNS16: 17

Range 1–127

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:DATA

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16:DATA PN9|PN15
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16:DATA?
```

This command configures the data pattern for the selected downlink OCNS.

***RST** PN9

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:POWer

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16:POWer <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16:POWer?
```

This command sets the power level for the selected downlink OCNS.

The variable `<val>` is expressed in units of dB.

***RST**	OCNS1: –6	OCNS2: –8	OCNS3: –8	OCNS4: –10
	OCNS5: –7	OCNS6: –9	OCNS7–16: –10	

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 820.

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:SSCOffset

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16:SSCOffset <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16:SSCOffset?
```

This command sets the secondary scrambling code offset for the selected downlink OCNS.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 820.

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:TOFFset

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16:TOFFset <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16:TOFFset?
```

This command adjusts the timing offset for the OCNS.

***RST**	OCNS1: 1	OCNS2: 2	OCNS3: 3	OCNS4: 4
	OCNS5: 5	OCNS6: 6	OCNS7: 7	OCNS8: 8
	OCNS9: 9	OCNS10: 10	OCNS11: 11	OCNS12: 12
	OCNS13: 13	OCNS14: 14	OCNS15: 15	OCNS16: 16

Range 0–149

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 820.

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16[:STATe]

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|
12|13|14|15|16[:STATe]?
```

This command turns the selected OCNS on or off.

***RST** 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 820.

:DLINk:PCCPch:BCH:DATA

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PCCPch:BCH:DATA PN9|PN15|FIX4|
"<file name>"
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PCCPch:BCH:DATA?
```

This command sets the BCH data format that is transmitted on the P-CCPCH.

`"<file name>"`	This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (downlink apply command) will not work. Refer to “File Overview” on page 818 for more information on files.
***RST**	FIX4
Remarks	Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 820.

:DLINk:PCCPch:BCH:DATA:FIX4

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PCCPch:BCH:DATA:FIX4 <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PCCPch:BCH:DATA:FIX4?
```

This command sets the BCH repeating 4-bit binary data pattern.

The variable `<val>` accepts values in binary, hexadecimal, or decimal format, however the query returns only binary values.

***RST**	0
Range	0–15
Remarks	Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 820.

:DLINk:PCCPch:CCODe

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PCCPch:CCODe <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PCCPch:CCODe?
```

This command sets the P-CCPCH channel code.

***RST**	+1
Range	0–255
Remarks	Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 820. Set all physical channel codes so they are orthogonal to each other. If any of the channel codes fail to meet this criteria, the apply function (downlink apply command) will not work.

:DLINk:PCCPch:POWer

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PCCPch:POWer <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PCCPch:POWer?
```

This command sets the P-CCPCH power level.

The variable `<val>` is expressed in decibels (dB).

***RST** –5.30000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:PCCPch[:STATe]

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PCCPch[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PCCPch[:STATe]?
```

This command turns the P-CCPCH on or off.

***RST** 1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:PICH:CCODe

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PICH:CCODe <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PICH:CCODe?
```

This command sets the PICH channelization code.

***RST** +3

Range 0–255

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

Set all physical channel codes so they are orthogonal to each other. If any of the channel codes fail to meet this criteria, the apply function (downlink apply command) will not work.

:DLINk:PICH:DATA

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PICH:DATA PN9|PN15|FIX4|
"<file name>"
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PICH:DATA?
```

This command sets the PICH data type.

`"<file name>"` This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (downlink apply command) will not work. Refer to “File Overview” on page 818 for more information on files.

***RST** PN9

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 820.

:DLINk:PICH:DATA:FIX4

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PICH:DATA:FIX4 <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PICH:DATA:FIX4?
```

This command sets the PICH repeating 4-bit binary data pattern.

The variable `<val>` accepts values in binary, hexadecimal, or decimal format, however the query returns only binary values.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:DLINk:APPLy” on page 820.

:DLINk:PICH:POWer

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PICH:POWer <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PICH:POWer?
```

This command sets the PICH power level.

The variable `<val>` is expressed in decibels (dB).

***RST** –8.300000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:PICH[:STATe]

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PICH[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PICH[:STATe]?
```

This command turns the PICH on or off.

***RST** 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:POLarity

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:POLarity NORMal|INVerted|INVert
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:POLarity?
```

This command selects the phase polarity of the downlink signal.

NORMal This choice selects normal polarity.

INVerted, INVert These choices perform the same function, inverting the internal Q signal.

***RST** NORM

Remarks Setting the command parameter while the signal is active also requires executing the apply command. For more information, refer to ":DLINk:APPLy" on page 820.

:DLINk:PSCH:POWer

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PSCH:POWer <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PSCH:POWer?
```

This command sets the PSCH power level.

The variable `<val>` is expressed in decibels (dB).

***RST** –8.30000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:PSCH[:STATe]

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PSCH[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:PSCH[:STATe]?
```

This command turns the PSCH on or off.

***RST** 1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. For more information, refer to ":DLINk:APPLy" on page 820.

:DLINk:SCRamblecode

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:SCRamblecode <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:SCRamblecode?
```

This command sets the downlink scramble code number.

***RST** +0

Range 0–511

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:SSCH:POWer

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:SSCH:POWer <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:SSCH:POWer?
```

This command sets the SSCH power level. The variable `<val>` is expressed in decibels (dB)

***RST** –8.30000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:SSCH[:STATe]

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:SSCH[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:SSCH[:STATe]?
```

This command turns the SSCH on or off.

***RST** 1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:DLINk:TXDiversity

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:TXDiversity NONE|OANT1|OANT2
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:DLINk:TXDiversity?
```

This command selects the downlink signal transmit diversity mode.

NONE This choice disables the transmit diversity mode.

OANT1 This choice selects the transmit diversity openloop antenna 1 mode.

OANT2 This choice selects the transmit diversity openloop antenna 2 mode.

***RST** NONE

Remarks To configure both antennas (one and two) requires two ESGs.

Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":DLINk:APPLy" on page 820.

:LINK

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:LINK DOWN|UP
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:LINK?
```

This command sets the uplink or downlink mode.

***RST** DOWN

:ULINk:APPLy

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:APPLy
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:APPLy?
```

This command applies changes to the channel setup and data for active physical and transport channels, immediately starting the channel coding generation process. A progress bar may appear on the ESG display indicating that the new signal parameters are being applied. Turning on the HSDPA modulation format also applies the signal parameters.

The query response determines whether or not there is a need to execute the command. It returns the following responses:

0	Command execution is not required.
1	Command execution is required.

NOTE The query response is only valid while the HDSPA format is active.

When there is a setting conflict (ESG reports an error) with the range values or coupled parameters, or both, executing the uplink apply command does not apply the new changes until the conflicts are resolved. After resolving the setting conflicts, execute the command to apply the new settings.

:ULINk:AWGN:CN

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:AWGN:CN <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:AWGN:CN?
```

This command sets the uplink in-band carrier to noise ratio (C/N) value using AWGN.

***RST** 0

Range –30 to 30

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to :ULINk:APPLy”.

:ULINk:AWGN[:STATe]

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:AWGN[:STATe] ON|OFF|0|1
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:AWGN[:STATe]?
```

This command turns the uplink AWGN on or off.

***RST** 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 857.

:ULINk:BBReference:EXTernal:MRATe

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:BBReference:EXTernal:MRATe X1|
X2|X4
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:BBReference:EXTernal:MRATe?
```

This command configures the ESG, so it can accept an external baseband generator clock that is a multiple of the internal 3.84 MHz chip clock.

X1 This sets the ESG to accept an external clock rate identical to the chip clock.

X2 This sets the ESG to accept an external clock rate that is two times the rate of the chip clock.

X4 This sets the ESG to accept an external clock rate that is four times the rate of the chip clock.

***RST** X1

:ULINk:BBReference[:SOURce]

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:BBReference[:SOURce] INT[1]|
EXT[1]
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:BBReference[:SOURce]?
```

This command selects the baseband generator reference source for the radio uplink channel.

***RST** INT

:ULINk:DPCCh:CCODe

Supported E4438C with Option 418

`[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPCCh:CCODe?`

This query returns the channelization code for the uplink DPCCH.

The slot format determines the channelization code in accordance with the 3GPP standards. See “:ULINk:DPCCh:SFORmat” on page 862 for setting the slot format.

:ULINk:DPCCh:DATA

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPCCh:DATA PN9|PN15|FIX4|
"<file name>"|STD
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPCCh:DATA?
```

This command configures the uplink DPCCH data pattern.

STD This sets the DPCCH bit fields according to the 3GPP standards.

`"<file name>"` This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (uplink apply command) will not work. Refer to “File Overview” on page 818 for more information on files.

***RST** STD

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 857.

:ULINk:DPCCh:DATA:FIX4

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPCCh:DATA:FIX4 <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPCCh:DATA:FIX4?
```

This command sets the uplink DPCCH repeating 4-bit binary data pattern.

The variable `<val>` accepts values in binary, hexadecimal, or decimal format, however the query returns only binary values.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

:ULINk:DPCCh:FBI:PATTern

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPCCh:FBI:PATTern PN9|PN15|FIX|
"<file name>"
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPCCh:FBI:PATTern?
```

This command configures the uplink DPCCH FBI pattern.

`"<file name>"` This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (uplink apply command) will not work. Refer to "File Overview" on page 818 for more information on files.

***RST** FIX

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

:ULINk:DPCCh:FBI:PATTern:FIX

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPCCh:FBI:PATTern:FIX <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPCCh:FBI:PATTern:FIX?
```

This command sets the 30-bit FBI pattern for the uplink DPCCH.

The variable `<val>` accepts values in binary, hexadecimal, or decimal format, however the query returns only binary values.

***RST** +0

Range 0–1073741823

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 857.

:ULINk:DPCCh:POWer

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPCCh:POWer <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPCCh:POWer?
```

This command sets the uplink DPCCH power level.

The variable `<val>` is expressed in decibels (dB)

***RST** –2.69000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 857.

:ULINk:DPCCh:SFORmat

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPCCh:SFORmat <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPCCh:SFORmat?
```

This command sets the uplink DPCCH slot format.

***RST** +0

Range 0–5

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

The slot format determines the settings for other parameters in accordance with 3GPP standards.

:ULINk:DPCCh[:STATe]

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPCCh[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPCCh[:STATe]?
```

This command turns the uplink DPCCH on or off.

***RST** 1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

:ULINk:DPCCh:TFCI

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPCCh:TFCI <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPCCh:TFCI?
```

This command sets the uplink DPCCH TFCI 10-bit data pattern.

The variable `<val>` accepts values in binary, hexadecimal, or decimal format, however the query returns only decimal values.

***RST** +0

Range 0–1023

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

:ULINk:DPCCh:TPC:NSTeps

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPCCh:TPC:NSTeps <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPCCh:TPC:NSTeps?
```

This command sets the number of steps for the down and up (DUP) or up and down (UDOWn) TPC pattern selections.

The variable `<val>` is expressed in decibels (dB).

***RST** +1

Range 1–80

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

:ULINk:DPCCh:TPC:PATTern

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPCCh:TPC:PATTern
UDOWn|DUP|UALL|DALL|"<file name>"
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPCCh:TPC:PATTern?
```

This command configures the uplink DPCCH TPC pattern for increasing or decreasing, or increasing and decreasing the BTS power level.

UDOWn The TPC pattern repetitively steps up and down.

DUP The TPC pattern repetitively steps down and up.

UALL The TPC pattern consecutively steps up.

DALL The TPC pattern consecutively steps down.

"<file name>" This variable represents a power pattern file stored in signal generator memory. The pattern must contain at least one bit or the apply function (downlink apply command) will not work. Refer to "File Overview" on page 818 for more information on files.

***RST** UDOW

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

Each step in a TPC pattern signals an increase or decrease of 1 dB in the BTS output power level.

:ULINk:DPDCh:CCODe

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:CCODe?
```

This query returns the uplink DPDCH channelization code.

The slot format determines the channelization code in accordance with the 3GPP standards. See ":ULINk:DPDCh:SFORmat" on page 869 for setting the slot format.

:ULINk:DPDCh:DATA

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:DATA PN9|PN15|FIX4|DCH|
"<file name>"
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:DATA?
```

This command configures the uplink DPDCH data pattern.

DCH This choice selects the transport channel as the data source.

"<file name>" This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (uplink apply command) will not work. Refer to "File Overview" on page 818 for more information on files.

***RST** PN9

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

:ULINk:DPDCh:DATA:FIX4

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:DATA:FIX4 <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:DATA:FIX4?
```

This command sets the uplink DPDCH repeating 4-bit binary data pattern.

The variable <val> accepts values in binary, hexadecimal, or decimal format, however the query returns only binary values.

***RST** 0

Range 0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

:ULINk:DPDCh:DCH[1]|2|3|4|5|6:BSIZe

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:
BSIZe <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:BSIZe?
```

This command sets the block size for the selected uplink DCH.

***RST** 20

Range 0–5000

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

The number of data bits per DCH cannot exceed 200,000. To maintain this data bit limit, the ESG calculates the product of the block size and the number of blocks. If the product of these two parameters exceeds 200,000, the apply function (uplink apply command) will not work.

:ULINk:DPDCh:DCH[1]|2|3|4|5|6:CRC

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:
CRC 0|8|12|16|24
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:CRC?
```

This command sets the number of CRC bits for the selected uplink DCH.

***RST** 8

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

:ULINk:DPDCh:DCH[1]|2|3|4|5|6:CTYPe

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:
CTYPe HCONv|TCONv|TURBo|NONE
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:CTYPe?
```

This command selects the encoder type for the selected uplink DCH.

HCONv	This choice selects the 1/2 rate convolutional encoder.
TCONv	This choice selects the 1/3 rate convolutional encoder.
TURBo	This choice selects the turbo coder.
NONE	This choice selects no coding.
***RST**	HCON
Remarks	Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

:ULINk:DPDCh:DCH[1]|2|3|4|5|6:DATA

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:DATA PN9|
PN15|FIX4|"<file name>"
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:DATA?
```

This command configures the data for the selected uplink DCH.

"<file name>"	This variable represents a data pattern file stored in signal generator memory. The data pattern must contain at least one bit or the apply function (uplink apply command) will not work. Refer to "File Overview" on page 818 for more information on files.
***RST**	PN9
Remarks	Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

:ULINk:DPDCh:DCH[1]|2|3|4|5|6:DATA:FIX4

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:DATA:
FIX4 <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:DATA:
FIX4?
```

This command sets the repeating 4-bit binary data pattern for the selected uplink DCH.

The variable <val> accepts values in binary, hexadecimal, or decimal format, however the query returns only binary values.

***RST**	0
Range	0–15

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

:ULINk:DPDCh:DCH[1]|2|3|4|5|6:NBLocks

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:
NBLocks <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:NBLocks?
```

This command sets the number of blocks for the selected uplink DCH.

***RST** 1

Range 0–512

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

The number of data bits per DCH cannot exceed 200,000. To maintain this data bit limit, the block size is multiplied by the number of blocks. If the product of these two parameters exceeds 200,000, the apply function (uplink apply command) will not work.

:ULINk:DPDCh:DCH[1]|2|3|4|5|6:RMATtribute

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:
RMATtribute <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:
RMATtribute?
```

This command sets the rate matching attribute for the selected uplink DCH.

***RST** 1

Range 1–256

Remarks Setting the command parameter while the signal is active also requires executing the apply command. For more information, refer to ":ULINk:APPLy" on page 857.

:ULINk:DPDCh:DCH[1]|2|3|4|5|6:TTI

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:
TTI 10|20|40|80
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:DCH[1]|2|3|4|5|6:TTI?
```

This command sets the TTI for the selected uplink DCH.

The choices are expressed in millisecond (ms).

***RST** 10

Remarks Setting the command parameter while the signal is active also requires executing the apply command. For more information, refer to “:ULINk:APPLy” on page 857.

:ULINk:DPDCh:DCH2|3|4|5|6[:STATe]

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:
DCH2|3|4|5|6[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:DCH2|3|4|5|6[:STATe]?
```

This command turns the selected uplink DCH on or off; DCH1 is always on.

***RST** *DCH 1*: 1 *DCH 2– 6*: 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 857.

The apply command will not work and the ESG will report an error if you turn on a DCH where lower numbered DCHs are off. For example, turning on DCH5 requires turning on DCH2–4. The reverse is true when turning off the DCHs.

:ULINk:DPDCh:POWer

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:POWer <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:POWer?
```

This command sets the uplink DPDCH power level.

The variable `<val>` is expressed in decibels (dB).

***RST** +0.00000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 857.

:ULINk:DPDCh:SFORmat

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:SFORmat <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh:SFORmat?
```

This command sets the uplink DPDCH slot format.

***RST** +2

Range 0– 6

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 857.

The slot format determines the settings for other parameters in accordance with the 3GPP standards.

:ULINk:DPDCh[:STATe]

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:DPDCh[:STATe]?
```

This command turns the uplink DPDCH on or off.

***RST** 1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 857.

:ULINk:FCLock:INTerval

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:FCLock:INTerval 10|20|40|80|2560
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:FCLock:INTerval?
```

This command selects the frame clock interval for the synchronization signal.

The frame clock interval is set in milliseconds (ms).

***RST** 80

Remarks Ensure that the selected interval is equal to or longer than the longest transport channel TTI period.

This command is applicable only when FCLock is the sync source selection. See ":ULINk:SYNC[:SOURce]" on page 878 for selecting the sync source.

:ULINk:FCLock:POLarity

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:FCLock:POLarity POSitive|
NEGative
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:FCLock:POLarity?
```

This command sets the frame clock polarity.

POSitive This choice sets the clock gate to trigger when the signal is high.

NEGative This choice sets the clock gate to trigger when the signal is low.

***RST** POS

Remarks This command is applicable only when FCLock is the sync source selection. See ":ULINk:SYNC[:SOURce]" on page 878 for selecting the sync source.

:ULINk:FILTer

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:FILTer RNYQuist|NYQuist|
GAUSsian|RECTangle|IS95|IS95_EQ|IS95_MOD|IS95_MOD_EQ|AC4Fm|UGGaussian|
"<user FIR>"
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:FILTer?
```

This command selects the uplink filter type.

IS95	This filter meets the criteria of the IS-95 standard.
IS95_EQ	This filter is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard and is best suited for IS-95 baseband filtering.
IS95_MOD	This filter meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.
IS95_MOD_EQ	This filter is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance), with lower passband rejection.
UGGaussian	This is a GSM Gaussian filter with a fixed BbT value of 0.300.
AC4Fm	This is a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.
"<user FIR>"	This variable represents any FIR filter file stored in signal generator memory. Refer to “File Overview” on page 818 for more information on files.
***RST**	RNYQ
Remarks	Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 857.

:ULINk:FILTer:ALPHa

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:FILTer:ALPHa <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:FILTer:ALPHa?
```

This command sets the uplink Nyquist or root Nyquist filter alpha value.

***RST** +2.20000000E–001

Range 0–1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Executing this command while a filter other than Nyquist or root Nyquist is selected changes the parameter value, but it is not used by the signal generator until one of the Nyquist filters is selected. Refer to ":ULINk:APPLy" on page 857.

:ULINk:FILTer:BBT

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:FILTer:BBT <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:FILTer:BBT?
```

This command sets the uplink Gaussian filter BbT value.

***RST** +5.00000000E–001

Range 0–1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

Executing this command while a filter other than the Gaussian filter is selected changes the parameter value, but it is not used by the signal generator until the Gaussian filter is selected.

:ULINk:FILTer:CHANnel

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:FILTer:CHANnel EVM|ACP
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:FILTer:CHANnel?
```

This command optimizes an uplink filter for minimized EVM or for minimized ACP.

EVM This choice provides the most ideal passband.

ACP This choice improves stopband rejection for the root Nyquist and Nyquist filters.

***RST** EVM

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

To change the filter selection, refer to ":ULINk:FILTer" on page 871.

:ULINk:FOFFset

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:FOFFset <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:FOFFset?
```

This command sets the CFN starting frame within the SFN by setting a frame offset relative to SFN zero.

***RST** 0

Range 0–255

Remarks The command adds delays to the internal frame counter by specifying the starting frame number count. When the frame offset (FOFFset) is set to 0, the frame number starts at the system sync trigger. When the FOFFset is set to 2, the signal generator triggers two frames after the SFN RST. For additional information, refer to 3GPP TS25.402 for SFN and CFN relationship.

:ULINk:HSDPcch:APATtern

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:HSDPcch:APATtern NONE|ACK_ALL|
"<file name>"
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:HSDPcch:APATtern?
```

This command sets the HS-DPCCH ACK/NACK transmission pattern for each of the 1280 subframes that make up the pattern.

NONE This choice sets all subframes to DTX.

`"<file name>"` This variable represents an ACK pattern file stored in signal generator memory. The file must contain 2,560-bits of data (2-bits per subframe) or the apply function (uplink apply command) will not work.

- An ACK response is represented by 00.
- A NACK response is represented by 01.
- DTX is represented by 10.

Enter the 2,560-bits into the file as a binary string.

Refer to “File Overview” on page 818 for more information on files.

***RST** ACK_ALL

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

:ULINk:HSDPcch:APOWer

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:HSDPcch:APOWer <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:HSDPcch:APOWer?
```

This command sets the HS-DPCCH ACK part power level.

The variable `<val>` is expressed in decibels (dB).

***RST** –2.69000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

:ULINk:HSDPcch:CCODe

Supported E4438C with Option 418

```
[:SOURce]RADio:WCDMa:HSDPa[:BBG]:ULINk:HSDPcch:CCODe?
```

This query returns the HS-DPCCH channelization code.

:ULINk:HSDPcch:CPATtern

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:HSDPcch:CPATtern NONE|
"<file name>"
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:HSDPcch:CPATtern?
```

This command sets the HS-DPCCH CQI transmission pattern for each of the 1280 subframes that make up the pattern.

NONE This choice sets all subframes to DTX.

`"<file name>"` This variable represents a bit file stored in signal generator memory. The file must contain 10,240-bits of data (8-bits per subframe) or the apply function (uplink apply command) will not work.

- A CQI response range is one to thirty using 8-bits, 00000001 to 00011110.

- DTX is represented by 11111111.

Enter the 10,240-bits into the file as a binary string.

Refer to “File Overview” on page 818 for more information on files.

***RST** NONE

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 857.

:ULINk:HSDPcch:CPOWer

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:HSDPcch:CPOWer <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:HSDPcch:CPOWer?
```

This command sets the HS-DPCCH CQI part power level.

The variable `<val>` is expressed in decibels (dB).

***RST** –2.69000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 857.

:ULINk:HSDPcch:NPOWer

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:HSDPcch:NPOWer <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:HSDPcch:NPOWer?
```

This command sets the HS-DPCCH NACK part power level. The variable `<val>` is expressed in decibels (dB).

***RST** –2.69000000E+000

Range –40 to 0

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to “:ULINk:APPLy” on page 857.

:ULINk:HSDPcch:SFDelay

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:HSDPcch:SFDelay <val>
```

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:HSDPcch:SFDelay?
```

This command sets the HS-DPCCH subframe delay. The variable `<val>` is expressed in units of 256 chips.

***RST** 0

Range 0–150

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

:ULINk:HSDPcch[:STATe]

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:HSDPcch[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:HSDPcch[:STATe]?
```

This command turns the HS-DPCCH on or off.

***RST** 1

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

:ULINk:POLarity

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:POLarity NORMal|INVerted|INVert
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:POLarity?
```

This command selects the phase polarity of the uplink signal.

NORMal This choice selects normal polarity.

INVerted, INVert These choices perform the same function, inverting the internal Q signal.

***RST** NORM

Remarks Setting the command parameter while the signal is active also requires executing the apply command. Refer to ":ULINk:APPLy" on page 857.

:ULINk:SCRamblecode

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:SCRamblecode <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:SCRamblecode?
```

This command sets the scramble code.

***RST** +0

Range 0–16777215

:ULINk:SDELay

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:SDELay <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:SDELay?
```

This command sets the uplink DPCH delay, measured in slots.

***RST** +0

Range 0–119

Remarks Calculate the delay between downlink and uplink DPCH, in slots, using the following formulas. Total Delay = (T0) + (TOFFset) + ((SDELay) * 2560 chips)

- T0 = 1024 chips
- TOFFset is set by “:ULINk:TOFFset” on page 878

Slot Delay = (Total Delay – T0) / 2560

:ULINk:SFNRst:POLarity

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:SFNRst:POLarity POSitive|
NEGative
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:SFNRst:POLarity?
```

This command sets the polarity of the system frame number reset signal for the uplink synchronization source.

POSitive This choice sets the signal to trigger when the trigger signal is high.

NEGative This choice sets the signal to trigger when the trigger signal is low.

***RST** POS

Remarks This command is applicable only when SFN_RST is the sync source selection. See “:ULINk:SYNC[:SOURce]” on page 878 for selecting the sync source.

:ULINk:SYNC:MODE

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:SYNC:MODE SINGle|CONTinuous
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:SYNC:MODE?
```

This command selects the uplink frame synchronization triggering mode.

SINGle The signal generator, once triggered, generates frames based on the reference clock.

CONTinuous The signal generator continuously aligns the frame timing with the frame sync trigger signal.

***RST** SING

:ULINk:SYNC[:SOURce]

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:SYNC[:SOURce] SFN_RST|FCLock
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:SYNC[:SOURce]?
```

This command selects the uplink frame synchronization source type.

SFN_RST The uplink signal triggers on the system frame number reset signal.

FCLock The uplink signal triggers on the frame clock.

***RST** FCL

:ULINk:TOFFset

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:TOFFset <val>
[:SOURce]:RADio:WCDMa:HSDPa[:BBG]:ULINk:TOFFset?
```

This command sets the uplink DPCH timing offset (delay), measured in chips.

***RST** +0

Range –512 to 2560

Remarks The downlink signal timing is provided by the synchronization signal.

Calculate the delay between downlink and uplink DPCH, in chips, using the following formulas:

Total Delay = (T0) + (TOFFset) + ((SDELay) * 2560 chips)

- T0 = 1024 chips
- SDELay is set by ":ULINk:SDELay" on page 877

Chip Delay = (Total Delay - T0) mod 2560

[:STATe]

Supported E4438C with Option 418

```
[:SOURce]:RADio:WCDMa:HSDPa[:BBG][:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:HSDPa[:BBG][:STATe]?
```

This command turns the HSDPA functionality on or off.

***RST** 0

Remarks This command only works when there is at least one active physical channel within the selected link.

NADC Subsystem–Option 402 ([:SOURce]:RADio[:NADC])

:ALPha

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:ALPHa <val>
[:SOURce]:RADio[:NADC]:ALPHa?
```

This command changes the Nyquist or root Nyquist filter's alpha value.

The filter alpha value can be set to a minimum level (0), a maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +3.50000000E–001

Range 0.000–1.000

Key Entry **Filter Alpha**

Remarks This command is effective only after choosing a root Nyquist or Nyquist filter; it does not effect other types of filters. To change the current filter type, refer to ":FILTer" on page 893.

:BBCLock

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:BBCLock INT[1]|EXT[1]
[:SOURce]:RADio[:NADC]:BBCLock?
```

This command toggles the data (bit) clock input to the baseband generator board to either internal or external. This command is independent in each mode and works for both non-burst (continuous) and burst modes. This allows for a matrix of selections between burst/non-burst, internal/external data generation, internal/external data clock, and external bit/symbol data clock.

INT[1] This choice selects the signal generator internal data clock.

EXT[1] This choice selects an external data clock input.

***RST** INT

Key Entry **BBG Data Clock Ext Int**

Remarks A data clock or continuous symbol sync input must be supplied when external mode is used.

:BBT

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:BBT <val>
[:SOURce]:RADio[:NADC]:BBT?
```

This command changes the bandwidth-multiplied-by-bit-time (BbT) filter parameter.

The filter BbT value can be set to the maximum level (1) or in between the minimum level (0.100) and maximum level by using fractional numeric values (0.101–0.999).

***RST** +5.00000000E–001

Range 0.100–1.000

Key Entry Filter BbT

Remarks This command is effective only after choosing a Gaussian filter. It does not have an effect on other types of filters. To change the current filter type, refer to ":FILTer" on page 893.

:BRATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:[:NADC]:BRATe <val>
[:SOURce]:RADio:[:NADC]:BRATe?
```

This command sets the bit rate in bits per second (bps–Mbps). The maximum bit rate is dependent on the modulation type and filter as shown in the following tables

The IQ digital data stream is shaped by a FIR filter. The filter length and associated latency and frequency response are dependent on the bit rate as shown in the following tables. The signal generator selects a filter length.

For higher bit rates, the FIR filter length may be truncated (if the minimum filter size allows it) which will impact the relative timing of the modulated data, as well as the actual filter response (see the symbol rate command ":SRATe" on page 972). Refer to ":FILTer" on page 893 for information on filter symbol widths.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 896.

When the bit rate is changed, the ESG reconfigures the baseband generator. The time required to reconfigure the baseband generator is inversely proportional to the bit rate: lower bit rates require more time.

***RST** +4.86000000E+004

Range

Modulation Type	Bit Rate Range		
	16 Symbol Wide Filter	*32 Symbol Wide Filter*	*64 Symbol Wide Filter*
BPSK, FSK2, MSK	1bps–50Mbps	1bps–25Mbps	1bps–12.5Mbps
C4FM, OQPSK, FSK4 OQPSKI95, QPSK P4QPPSK, QPSKIS95 GRAYQPSK, QAM4	2bps–50Mbps	2bps–25Mbps	2bps–12.5Mbps
D8PSK, EDGE, FSK8, PSK8	3bps–50Mbps	3bps–25Mbps	3bps–12.5Mbps
FSK16, PSK16, QAM16	4bps–50Mbps	4bps–25Mbps	4bps–12.5Mbps
QAM32	5bps–50Mbps	5bps–25Mbps	5bps–12.5Mbps
QAM64	6bps–50Mbps	6bps–25Mbps	6bps–12.5Mbps
QAM128	7bps–50Mbps	7bps–25Mbps	7bps–12.5Mbps
QAM256	8bps–50Mbps	8bps–25Mbps	8bps–12.5Mbps

Key Entry **Symbol Rate**

:BURSt:PN9

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:BURSt:PN9 NORMal|QUICk
[:SOURce]:RADio[:NADC]:BURSt:PN9?
```

This command controls the software PN9 generation.

NORMal This choice produces a maximum length PN9 sequence.

QUICk This choice produces a truncated PN9 sequence.

***RST** NORM

Key Entry **PN9 Mode Normal Quick**

Remarks Use Normal mode for bit-error-rate tests where a maximum length PN9 sequence is required.

:BURSt:SHAPe[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:BURSt:SHAPe[:TYPE] SINE|"<file name>"
[:SOURce]:RADio[:NADC]:BURSt:SHAPe[:TYPE]?
```

This command specifies the burst shape as either `SINE` or a user-defined file (`"<file name>"`).

SINE This choice selects a state that is defined by the burst rise and fall *RST values, as the default burst shape type.

`"<file name>"` This choice selects a user designated file from signal generator memory (non-volatile).

***RST** SINE

Key Entry **Sine** **User File**

:BURSt:SHAPe:FALL:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:BURSt:SHAPe:FALL:DELay <val>
[:SOURce]:RADio[:NADC]:BURSt:SHAPe:FALL:DELay?
```

This command sets the burst shape fall delay.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +0.00000000E+000

Range –22.3750 to 99

Key Entry **Fall Delay**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 896. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:FDELay" on page 884 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:FALL:TIME

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:BURSt:SHAPe:FALL:TIME <val>
[:SOURce]:RADio[:NADC]:BURSt:SHAPe:FALL:TIME?
```

This command sets the burst shape fall time.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +5.00000000E+000

Range 0.1250–255.8750

Key Entry **Fall Time**

Remarks The setting enabled by this command is not affected by signal

generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 896. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:FTIMe" on page 885 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:FDELay

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:BURSt:SHAPe:FDELay <val>
[:SOURce]:RADio[:NADC]:BURSt:SHAPe:FDELay?
```

This command sets the burst shape fall delay.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +0.00000000E+000

Range –22.3750 to 99

Key Entry **Fall Delay**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 896. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:FALL:DELay" on page 883 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:FTIMe

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:BURSt:SHAPe:FTIMe <val>
[:SOURce]:RADio[:NADC]:BURSt:SHAPe:FTIMe?
```

This command sets the burst shape fall time.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +0.00000000E+000

Range 0.1250–255.8750

Key Entry **Fall Time**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 896. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:FALL:TIME" on page 884 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:RDELay

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:BURSt:SHAPe:RDELay <val>
[:SOURce]:RADio[:NADC]:BURSt:SHAPe:RDELay?
```

This command sets the burst shape rise delay.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +0.00000000E+000

Range –17.3750 to 99

Key Entry **Rise Delay**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 896. Refer to ":SRATe" on page 972 for minimum and maximum symbol rate values.

":BURSt:SHAPe:RISE:DELay" on page 886 performs the same function; in compliance with the SCPI standard, both commands are listed.

Refer to the *E4428C/38C ESG Signal Generators User's Guide* for more information.

:BURSt:SHAPe:RISE:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:BURSt:SHAPe:RISE:DELay <val>
[:SOURce]:RADio[:NADC]:BURSt:SHAPe:RISE:DELay?
```

This command sets the burst shape rise delay.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +0.00000000E+000

Range –17.3750 to 99

Key Entry **Rise Delay**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

To change the modulation type, refer to “:MODulation[:TYPE]” on page 896. Refer to “:SRATe” on page 972 for a list of the minimum and maximum symbol rate values.

“:BURSt:SHAPe:RDELay” on page 886 performs the same function; in compliance with the SCPI standard, both commands are listed.

Refer to the *E4428C/38C ESG Signal Generators User’s Guide* for more information.

:BURSt:SHAPe:RISE:TIME

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:BURSt:SHAPe:RISE:TIME <val>
[:SOURce]:RADio[:NADC]:BURSt:SHAPe:RISE:TIME?
```

This command sets the burst shape rise time.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +5.00000000E+000

Range 0.1250–22.5000

Key Entry Rise Time

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

To change the modulation type, refer to “:MODulation[:TYPE]” on page 896. Refer to “:SRATe” on page 972 for a list of the minimum and maximum symbol rate values.

“:BURSt:SHAPe:RTIMe” on page 888 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User’s Guide*.

:BURSt:SHAPe:RTIMe

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:BURSt:SHAPe:RTIMe <val>
[:SOURce]:RADio[:NADC]:BURSt:SHAPe:RTIMe?
```

This command sets the burst shape rise time.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +5.00000000E+000

Range 0.1250–22.5000

Key Entry **Rise Time**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 896. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:RISE:TIME" on page 887 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:BURSt[:STATe] ON|OFF|1|0
[:SOURce]:RADio[:NADC]:BURSt[:STATe]?
```

This command enables or disables the burst function.

ON (1) This choice enables the transmission of framed data. If all timeslots which are switched on are up traffic channels or custom, you will be bursting the timeslots that are on; there will be no RF carrier during the off timeslots.

If you have switched on any timeslot that you have configured as a down traffic channel, the RF carrier is not switched off between any of the timeslots. The off timeslots are transmitted as a continuous series of ones for the time period of the off timeslots.

OFF (0) This choice enables the transmission of unframed data.

***RST** 0

Key Entry **Data Format Pattern Framed**

:BURSt:SHAPe[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:BURSt:SHAPe[:TYPE] SINE|"<file name>"
[:SOURce]:RADio[:NADC]:BURSt:SHAPe[:TYPE]?
```

This command specifies the burst shape as either `SINE` or a user-defined file (`"<file name>"`).

SINE This choice selects a state that is defined by the burst rise and fall *RST values, as the default burst shape type.

`"<file name>"` This choice selects a user designated file from signal generator memory (non-volatile).

***RST** SINE

Key Entry **Sine** **User File**

:CHANnel

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:CHANnel EVM|ACP
[:SOURce]:RADio[:NADC]:CHANnel?
```

This command optimizes the Nyquist and root Nyquist filters to minimize error vector magnitude (EVM) or to minimize adjacent channel power (ACP).

EVM This choice provides the most ideal passband.

ACP This choice improves stopband rejection.

***RST** ACP

Key Entry **Optimize FIR For EVM ACP**

Remarks To change the current filter type, refer to “:FILTer” on page 893.

:DATA

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:DATA PN9|PN11|PN15|PN20|PN23|FIX4|"<file name>"|
EXT|P4|P8|P16|P32|P64|PRAM
[:SOURce]:RADio[:NADC]:DATA?
```

This command sets a pseudo-random number sequence, 4-bit pattern, sequence of 1’s and 0’s, data from an external source, or a user file as the data pattern for unframed transmission.

***RST** PN23

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **Ext**

4 1’s & 4 0’s **8 1’s & 8 0’s** **16 1’s & 16 0’s** **32 1’s & 32 0’s**

64 1’s & 64 0’s **PRAM File**

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:DATA:PRAM

Supported E4438C with Option 402

```
[:SOURce]:RADio:[NADC]:DATA:PRAM "<file_name>"
[:SOURce]:RADio:[NADC]:DATA:PRAM?
```

This command selects a pattern RAM (PRAM) file as the pattern data type for the NADC (North American Digital Cellular) format.

`"<file_name>"` This variable designates the PRAM file in WFM1. Refer to “File Name Variables” on page 13 for information on the file name syntax.

Key Entry **PRAM File**

Remarks Selecting this data source forces the burst source to `INTernal` to allow framing control. The PRAM file must reside in the signal generator’s volatile memory (WFM1) in order to be accessed by this command. For more information refer to “:DATA:PRAM:FILE:BLOCk” on page 112

:DATA:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:DATA:FIX4 <val>
[:SOURce]:RADio[:NADC]:DATA:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern for unframed transmission according to the modulation type, symbol rate, filter, and burst shape selected for the NADC (North American Digital Cellular) modulation format.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type.

:DEFault

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:DEFault
```

This command returns all of the NADC (North American Digital Cellular) modulation format parameters to factory settings. It does not affect any other signal generator parameters.

Key Entry **Restore NADC Factory Default**

:EDATa:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:EDATa:DELay?
```

This query returns the amount of delay (in symbols) from the external data input to the beginning of the symbol on the I OUT and Q OUT rear panel connectors and the front panel RF OUTPUT connector.

Remarks When the format is turned off, the delay value is unchanged; the query will return the same delay value if the format is on or off.

:EDCLock

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:EDCLock SYMBol|NORMal
[:SOURce]:RADio[:NADC]:EDCLock?
```

This command sets the external data clock use.

SYMBol This choice specifies that a continuous symbol clock signal must be provided to the SYMBOL SYNC input connector.

NORMal This choice specifies that the DATA CLOCK input connector requires a bit clock. The SYMBOL SYNC input connector requires a (one-shot or continuous) symbol sync signal.

***RST** NORM

Key Entry **Ext Data Clock Normal Symbol**

Remarks Both choices have no effect in internal clock mode. Refer to ":BBCLock" on page 880 to select EXT as the data clock type.

:EREFerence

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:EREFerence INT|EXT
[:SOURce]:RADio[:NADC]:EREFerence?
```

This command selects either an internal or external bit-clock reference for the data generator.

***RST** INT

Key Entry **BBG Ref Ext Int**

Remarks If the EXT choice is selected, the external source's frequency value must be applied to the BASEBAND GEN REF IN rear panel connector. The external reference and external data clock are not applicable at the same time. If both are selected, then the external reference takes precedence.

Refer to, ":EREFerence:VALue" on page 893 to enter the external reference frequency setting.

:EREFerence:VALue

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:EREFerence:VALue <val>
[:SOURce]:RADio[:NADC]:EREFerence:VALue?
```

This command sets the expected bit-clock reference frequency value for an externally applied reference signal.

The variable `<val>` is expressed in units of hertz (Hz–MHz).

***RST**	+1.30000000E+007
Range	2.5E5–1E8
Key Entry	**Ext BBG Ref Freq**
Remarks	The value specified by this command is effective only when you are using an external reference applied to the BASEBAND GEN REF IN rear panel connector. Refer to ":EREFerence" on page 892 to select EXT (external source) as the reference for the bit-clock.

:FILTer

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:FILTer RNYQuist|NYQuist|GAUSsian|RECTangle|IS95|
IS95_EQ|IS95_MOD|IS95_MOD_EQ|AC4Fm|UGGaussian|"<user FIR>"
[:SOURce]:RADio[:NADC]:FILTer?
```

This command selects the pre-modulation filter type.

IS95	This choice selects a filter that meets the criteria of the IS-95 standard.
IS95_EQ	This choice selects a filter which is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard. This filter is only used for IS-95 baseband filtering.
IS95_MOD	This choice selects a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.
IS95_MOD_EQ	This choice selects a filter which is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance), with lower passband rejection.
AC4Fm	This choice selects a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.

UGGaussian	This choice selects a backwards compatible GSM Gaussian filter (Gaussian filter with a fixed BbT value of 0.300) for the ESG E44xxB Option UN3 or UN4.
`"<user FIR>"`	This variable is any filter file that you have stored into memory.
***RST**	RNYQ
Key Entry	**Root Nyquist** **Nyquist** **Gaussian** **Rectangle** **IS-95** **IS-95 w/EQ** **IS-95 Mod** **IS-95 Mod w/EQ** **APCO 25 C4FM** **UN3/4 GSM Gaussian** **User FIR**
Remarks	Refer to "File Name Variables" on page 13 for information on the file name syntax.

:FRATe

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:FRATe FULL|HALF
[:SOURce]:RADio[:NADC]:FRATe?
```

This command toggles between a full- or half-rate traffic channel.

FULL	Selects two equally spaced timeslots of the frame. Since there are six timeslots per frame, timeslots 1, 2, and 3 are paired with timeslots 4, 5, and 6, respectively.
HALF	Selects one timeslot of the frame (6 individual timeslots per frame).
***RST**	FULL
Key Entry	**Rate Full Half**

:IQ:SCALe

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:IQ:SCALe <val>
[:SOURce]:RADio[:NADC]:IQ:SCALe?
```

This command sets the amplitude of the I/Q outputs for better adjacent channel power (ACP); lower scaling values equate to better ACP.

The variable `<val>` is expressed in units of percent.

***RST**	+100
Range	1–200
Key Entry	**I/Q Scaling**
Remarks	This command has no effect with MSK or FSK modulation.

:MODulation:FSK[:DEViation]

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:MODulation:FSK[:DEViation] <val>
[:SOURce]:RADio[:NADC]:MODulation:FSK[:DEViation]?
```

This command sets the symmetric FSK frequency deviation value. The variable `<val>` is expressed in units of Hertz and the maximum range value equals the current symbol rate value multiplied by four, limited to 20 MHz

***RST** +4.00000000E+002

Range 0–2E7

Key Entry **Freq Dev**

Remarks To change the modulation type, refer to ":MODulation[:TYPE]" on page 896.

Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

To set an asymmetric FSK deviation value, refer to the *E4428C/38C ESG Signal Generators User's Guide for more information*.

:MODulation:MSK[:PHASe]

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:MODulation:MSK[:PHASe] <val>
[:SOURce]:RADio[:NADC]:MODulation:MSK[:PHASe]?
```

This command sets the MSK phase deviation value. The variable `<val>` is expressed in units of degrees.

***RST** +9.00000000E+001

Range 0–100

Key Entry **Phase Dev**

:MODulation:UFSK

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:MODulation:UFSK "<file name>"
[:SOURce]:RADio[:NADC]:MODulation:UFSK?
```

This command selects a user-defined FSK file from the signal generator memory.

Key Entry **User FSK**

Remarks The user-defined FSK file is held in signal generator memory until the command that selects user FSK as the modulation type is sent. Refer to ":MODulation[:TYPE]" on page 896 to change the current modulation type.

Refer to "File Name Variables" on page 13 for information on the file name syntax.

:MODulation:UIQ

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:MODulation:UIQ "<file name>"
[:SOURce]:RADio[:NADC]:MODulation:UIQ?
```

This command selects a user-defined I/Q file from the signal generator memory.

Key Entry **User I/Q**

Remarks The user-defined I/Q file is held in signal generator memory until the command that selects user I/Q as the modulation type is sent. Refer to ":MODulation[:TYPE]" on page 896 to change the current modulation type.

Refer to "File Name Variables" on page 13 for information on the file name syntax.

:MODulation[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:MODulation[:TYPE] BPSK|QPSK|IS95QPSK|GRAYQPSK|
OQPSK|IS95OQPSK|P4DQPSK|PSK8|PSK16|D8PSK|MSK|FSK2|FSK4|FSK8|FSK16|C4FM|
QAM4|QAM16|QAM32|QAM64|QAM128|QAM256|UIQ|UFSK
[:SOURce]:RADio[:NADC]:MODulation[:TYPE]?
```

This command sets the modulation type for the NADC personality.

***RST** P4DQPSK

Key Entry **BPSK** **QPSK** **IS-95 QPSK** **Gray Coded QPSK** **OQPSK**

IS-95 OQPSK **π/4 DQPSK** **8PSK** **16PSK** **D8PSK** **MSK** **2-Lvl FSK**

4-Lvl FSK **8-Lvl FSK** **16-Lvl FSK** **C4FM** **4QAM** **16QAM** **32QAM**

64QAM **128QAM** **256QAM** **User I/Q** **User FSK**

:REPeat

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:REPeat SINGle|CONTinuous
[:SOURce]:RADio[:NADC]:REPeat?
```

This command sets the rotation direction of the phase modulation vector.

SINGle This choice outputs one occurrence of the selected frame.

CONTinuous This choice outputs a continuous stream of the selected frame.

***RST** SING

Key Entry **Frame Repeat Single Cont**

:POLarity[:ALL]

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:POLarity[:ALL] NORMal|INVerted
[:SOURce]:RADio[:NADC]:POLarity[:ALL]?
```

This command sets the rotation direction of the phase modulation vector.

NORMal This choice selects normal phase polarity.

INVerted This choice inverts the internal Q signal.

***RST** NORM

Key Entry **Polarity Normal Invert**

:SECondary:RECall

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SECondary:RECall
```

This command recalls the secondary frame configuration, overwriting the current state.

Key Entry **Recall Secondary Frame State**

Remarks To save a secondary frame state, refer to ":SECondary:SAVE" on page 898.

A secondary frame is not active until the secondary state is enabled. To activate a secondary frame, refer to ":SECondary[:STATe]" on page 898.

:SECondary:SAVE

Supported E4438C with Option 402

`[:SOURce]:RADio[:NADC]:SECondary:SAVE`

This command saves the current frame configuration as the secondary frame with the filename `NADC_SECONDARY_FRAME`.

Key Entry **Save Secondary Frame State**

Remarks To recall the secondary frame (saved in non-volatile signal generator memory), refer to “:SECondary:RECall” on page 897.

:SECondary:TRIGger[:SOURce]

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SECondary:TRIGger[:SOURce] KEY|EXT|BUS
[:SOURce]:RADio[:NADC]:SECondary:TRIGger[:SOURce]?
```

This command selects the type of triggering for the secondary frame.

KEY This choice enables triggering by pressing the front panel **Trigger** hardkey.

EXT This choice enables triggering using an externally applied signal at the PATT TRIG IN rear panel connector or the PATT TRIG IN 2 pin on the rear panel AUX I/O connector. To select the appropriate connector, refer to “:TRIGger[:SOURce]:EXTernal[:SOURce]” on page 912.

BUS This choice enables GPIB triggering using the `*TRG` or `GET` command or LAN and RS-232 triggering using the `*TRG` command.

Key Entry **Trigger Key** **Ext** **Bus**

:SECondary[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SECondary[:STATe] ON|OFF|1|0
[:SOURce]:RADio[:NADC]:SECondary[:STATe]?
```

This command enables or disables the ability to switch to the secondary frame.

***RST** 0

Key Entry **Secondary Frame Off On**

Remarks A frame must already be saved as the secondary frame in order to turn the secondary state function on.

To save a frame as the secondary frame, refer to ":SECondary:SAVE" on page 898.

:SLOT[1]|2|3|4|5|6:DCUStom

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:DCUStom
PN9|PN11|PN15|PN20|PN23|FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:DCUStom?
```

This command configures the data field for the selected downlink custom timeslot.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1's & 4 0's **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's**

64 1's & 64 0's

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:SLOT[1]|2|3|4|5|6:DCUStom:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:DCUStom:FIX4 <val>
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:DCUStom:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected downlink custom timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks `FIX4` must already be defined as the data type.

:SLOT[1]|2|3|4|5|6:DTCHannel:CDLocator

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:DTCHannel:
CDLocator <bit_pattern>
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:DTCHannel:CDLocator?
```

This command changes the 11-bit coded digital control channel locator (CDL) field.

***RST** #H000

Range #H0–#H7FF

Key Entry **CDL**

Remarks The preset hexadecimal value (when normal preset is selected) for CDL reflects the NADC protocol; however, you can enter a new value by using this command.

:SLOT[1]|2|3|4|5|6:DTCHannel:CDVCcode

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:DTCHannel:
CDVCcode <bit_pattern>
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:DTCHannel:CDVCcode?
```

This command changes the 12-bit coded digital verification color code (CDVCC).

***RST** #H000

Range #H0–#HFFF

Key Entry **CDVCC**

Remarks The preset hexadecimal value (when normal preset is selected) for CDVCC reflects the NADC protocol; however, you can enter a new value by using this command.

:SLOT[1]|2|3|4|5|6:DTCHannel:SACChannel

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:DTCHannel:
SACChannel <bit_pattern>
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:DTCHannel:SACChannel?
```

This command changes the 15-bit slow associated control channel.

***RST** #H000

Range	#H0–#HFFF
Key Entry	**SACCH**
Remarks	The preset hexadecimal value (when normal preset is selected) for SACCH reflects the value specified by the standard.

:SLOT[1]|2|3|4|5|6:DTCHannel:SWORd

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:DTCHannel:SWORd <bit_pattern>
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:DTCHannel:SWORd?
```

This command sets the 28-bit synchronization word as the active function. This is used for slot synchronization, equalizer training, and timeslot identification.

***RST**	#HA91DE4A
Range	#H0–#HFFFFFFF
Key Entry	SYNC

:SLOT[1]|2|3|4|5|6:DTCHannel[:DATA]

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:DTCHannel[:DATA] PN9|
PN11|PN15|PN20|PN23|FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:DTCHannel[:DATA]?
```

This command sets a pseudo-random number sequence, 4-bit pattern, sequence of 1’s and 0’s, data from an external source, or a user file as the data pattern for the selected downlink traffic channel timeslot during framed transmission.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1’s & 4 0’s **8 1’s & 8 0’s** **16 1’s & 16 0’s** **32 1’s & 32 0’s**

64 1’s & 64 0’s

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:SLOT[1]|2|3|4|5|6:DTCHannel[:DATA]FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:DTCHannel[:DATA]:FIX4 <val>
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:DTCHannel[:DATA]:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected downlink traffic channel timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks `FIX4` must already be defined as the data type.

:SLOT[1]|2|3|4|5|6:POWer

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:POWer MAIN|DELTa
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:POWer?
```

This command toggles the RF output power level function for the selected timeslot.

MAIN This choice specifies RF output as the main power level.

DELTa This choice specifies RF output as the alternative power level.

***RST** MAIN

Key Entry **Timeslot Ampl Main Delta**

:SLOT[1]|2|3|4|5|6:STATe

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:STATe ON|OFF|1|0
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:STATe?
```

This command enables or disables the operating state of the selected timeslot.

***RST** Timeslot 1: 1 Timeslots 2–6: 0

Key Entry **Timeslot Off On**

:SLOT[1]|2|3|4|5|6:UCUStom

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:UCUStom PN9|PN11|PN15|
PN20|PN23|FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:UCUStom?
```

This command configures the data field for the selected uplink custom timeslot.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1's & 4 0's **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's**

64 1's & 64 0's

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:SLOT[1]|2|3|4|5|6:UCUStom:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:UCUStom:FIX4 <val>
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:UCUStom:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected uplink custom timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks `FIX4` must already be defined as the data type.

:SLOT[1]|2|3|4|5|6:UTCHannel:CDVCcode

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:UTCHannel:
CDVCcode <bit_pattern>
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:UTCHannel:CDVCcode?
```

This command changes the 12-bit coded digital verification color code (CDVCC).

***RST** #H000

Range #H0–#HFFF

Key Entry **CDVCC**

Remarks The preset hexadecimal value (when normal preset is selected) for CDVCC reflects the NADC protocol, however you can enter a new value by using this command.

:SLOT[1]|2|3|4|5|6:UTCHannel:SACChannel

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:UTCHannel:SACChannel
<bit_pattern>
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:UTCHannel:SACChannel?
```

This command changes the 15-bit slow associated control channel.

***RST** #H000

Range #H0–#HFFF

Key Entry **SACCH**

Remarks The preset hexadecimal value (when normal preset is selected) for SACCH reflects the value specified by the standard.

:SLOT[1]|2|3|4|5|6:UTCHannel:SWORd

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:UTCHannel:SWORd <bit_pattern>
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:UTCHannel:SWORd?
```

This command sets the 28-bit synchronization word as the active function. This is used for slot synchronization, equalizer training, and timeslot identification.

***RST** #HA91DE4A

Range #H0–#HFFFFFFF

Key Entry **SYNC**

:SLOT[1]|2|3|4|5|6:UTCHannel[:DATA]

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:UTCHannel[:DATA] PN9|PN15|
FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:UTCHannel[:DATA]?
```

This command sets a pseudo-random number sequence, 4-bit pattern, sequence of 1's and 0's, data from an external source, or a user file as the data pattern for the selected uplink traffic channel timeslot during framed transmission.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1's & 4 0's **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's**

64 1's & 64 0's

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:SLOT[1]|2|3|4|5|6:UTCHannel[:DATA]:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:UTCHannel[:DATA]:FIX4 <val>
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6:UTCHannel[:DATA]:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected uplink traffic channel timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks `FIX4` must already be defined as the data type.

:SLOT[1]|2|3|4|5|6[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6[:TYPE] UCUStom|DCUStom|UTCH|
UTCH_ALL|DTCH|DTCH_ALL
[:SOURce]:RADio[:NADC]:SLOT[1]|2|3|4|5|6[:TYPE]?
```

This command sets the timeslot type for the selected timeslot.

***RST** Timeslot 1: UTCH Timeslots 2–6: UCUS

Key Entry **Up Custom** **Down Custom** **Up TCH** **Up TCH All** **Down TCH**

Down TCH All

:SOUT

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SOUT FRAME|SLOT|ALL
[:SOURce]:RADio[:NADC]:SOUT?
```

This command sets the synchronization location (within the pattern of data) and the type of output at the EVENT 1 rear panel connector.

FRAME	This choice outputs a 1-bit signal, synchronized to the bit selected by the synchronization output offset command, for a framed data pattern.
SLOT	This choice outputs a 1-bit signal, synchronized to the bit selected by the synchronization output offset command, for a selected timeslot.
ALL	This choice outputs a 1-bit signal, synchronized to the bit selected by the synchronization output offset command, for all active timeslots.

***RST** FRAME

Key Entry **Begin Frame** **Begin Timeslot #** **All Timeslots**

:SOUT:OFFSet

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SOUT:OFFSet <val>
[:SOURce]:RADio[:NADC]:SOUT:OFFSet?
```

This command sets the offset value for the location of the output synchronization signal on the EVENT1 rear panel connector relative to the beginning of the framed data pattern or timeslot.

The variable `<val>` is expressed as a number of bits.

***RST** +0

Range –323 to 323

Key Entry **Sync Out Offset**

Remarks Negative values move the synchronization output signal earlier; positive values move it later.

To change the output of the EVENT1 rear panel connector to SLOT, refer to “:SOUT” on page 906.

:SOUT:SLOT

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SOUT:SLOT <val>
[:SOURce]:RADio[:NADC]:SOUT:SLOT?
```

This command selects the timeslot that will trigger a 1-bit output signal at the EVENT 1 rear panel connector.

***RST** +1

Range 1–3

Key Entry **Begin Timeslot #**

Remarks To change the output of the EVENT1 rear panel connector to SLOT, refer to ":SOUT" on page 906.

:SRATe

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:SRATe <val>
[:SOURce]:RADio[:NADC]:SRATe?
```

This command sets the transmission symbol rate. Symbol rate is the bit rate divided by the bits per symbol. A change in the symbol rate affects the bit rate. Refer to ":BRATe" on page 780 for information on bit rate.

The variable `<val>` is expressed in units of symbols per second (sps–Msps) and the maximum symbol rate depends on the filter. Refer to ":FILTer" on page 893 for minimum filter symbol width.

The filter may have to be truncated down to 32 or 16 symbols wide to achieve the highest symbol rate. The signal generator's internal filters are not truncated below their minimum filter length and user-defined FIR filters are not truncated. If the filter cannot be truncated then the symbol rate is limited to the maximum rate of the narrowest filter size possible.

The relative timing of the modulated data, as well as the actual filter response is affected when the filter is truncated.

When the symbol rate changes, the ESG reconfigures the baseband generator. The time required to reconfigure the baseband generator is inversely proportional to the symbol rate: lower symbol rates require more time.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 896.

***RST** +2.43000000E+004

Range

Modulation Type	Symbol Rate Range		
	16 Symbol Wide Filter	*32 Symbol Wide Filter*	*64 Symbol Wide Filter*
BPSK, FSK2, MSK	1sps–50Msps	1sps–25Msps	1sps–12.5Msps
C4FM, OQPSK, FSK4 OQPSKI95, QPSK P4QPPSK, QPSKIS95 GRAYQPSK, QAM4	2sps–25Msps	2sps–12.5Msps	2sps–6.25Msps
D8PSK, EDGE, FSK8, PSK8	3sps–16.666666666 Msps	3sps–8.333333333 Msps	3sps–4.166666666Msps
FSK16, PSK16, QAM16	4sps–12.5Msps	4sps–6.25Msps	4sps–3.125Msps
QAM32	5sps–10Msps	5sps–5Msps	5sps–2.5Msps
QAM64	6sps–8.333333333 Msps	6sps–4.166666666 Msps	6sps–2.083333333 Msps
QAM128	7sps–7.142857142 Msps	7sps–3.571428572 Msps	7sps–1.785714285 Msps
QAM256	8sps–6.25Msps	8sps–3.125 Msps	8sps–1.5625 Msps

NOTE Using I/Q skew will half the minimum number of symbols for the selected filter.

Key Entry **Symbol Rate**

:TRIGger:TYPE

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:TRIGger:TYPE CONTinuous|SINGle|GATE
[:SOURce]:RADio[:NADC]:TRIGger:TYPE?
```

This command sets the trigger type.

CONTinuous	The framed data sequence repeats continuously; the sequence restarts every time the previous playback is completed. To customize continuous triggering, refer to ":TRIGger:TYPE:CONTinuous[:TYPE]" on page 909.
SINGle	The framed data sequence plays once for every trigger received.
GATE	An external trigger signal interrupts the playback while the gating signal is in the inactive state. Playback resumes when the external control signal returns to the active state. The active state can be set to high or low.
***RST**	CONT
Key Entry	**Continuous** **Single** **Gated**

:TRIGger:TYPE:CONTinuous[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:TRIGger:TYPE:CONTinuous[:TYPE] FREE|TRIGger|RESet
[:SOURce]:RADio[:NADC]:TRIGger:TYPE:CONTinuous[:TYPE]?
```

This commands selects the waveform's response to a trigger signal while using the continuous trigger mode.

For more information on triggering and to select the continuous trigger mode, see ":TRIGger:TYPE" on page 908.

The following list describes the waveform's response to each of the command choices:

FREE	Turning the ARB format on immediately triggers the waveform. The waveform repeats until you turn the format off, select another trigger, or choose another waveform file.
TRIGger	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously until you turn the format off, select another trigger, or choose another waveform file.
RESet	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously. Subsequent triggers reset the waveform to the beginning. For a waveform sequence, this means to the beginning of the first segment in the sequence.
***RST**	FREE
Key Entry	**Free Run** **Trigger & Run** **Reset & Run**

:TRIGger:TYPE:GATE:ACTive

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:TRIGger:TYPE:GATE:ACTive LOW|HIGH
[:SOURce]:RADio[:NADC]:TRIGger:TYPE:GATE:ACTive?
```

This command selects the active state (gate polarity) of the gate while using the gating trigger mode.

The LOW and HIGH selections correspond to the low and high states of an external trigger signal. For example, when you select HIGH, the active state occurs during the high of the trigger signal. When the active state occurs, the ESG stops the waveform playback at the last played sample point, then restarts the playback at the next sample point when the inactive state occurs. For more information on triggering and to select gating as the trigger mode, see ":TRIGger:TYPE" on page 908.

The following list describes the signal generator's external trigger signal gating behavior for the polarity selections:

LOW The waveform playback stops when the trigger signal goes low (active state) and restarts when the trigger signal goes high (inactive state).

HIGH The waveform playback stops when the trigger signal goes high (active state) and restarts when the trigger signal goes low (inactive state).

***RST** HIGH

Key Entry **Gate Active Low High**

:TRIGger[:SOURce]

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:TRIGger[:SOURce] KEY|EXT|BUS
[:SOURce]:RADio[:NADC]:TRIGger[:SOURce]?
```

This command sets the trigger source.

For more information on triggering, see ":TRIGger:TYPE" on page 908. The following list describes the command choices:

KEY This choice enables manual triggering by pressing the front-panel **Trigger** hardkey.

EXT An externally applied signal triggers the waveform. This is the only choice that works with gating. The following conditions affect an external trigger:

- The input connector selected for the trigger signal. You have a choice between the rear-panel PATTERN TRIG IN connector or the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector. To make the connector selection, see ":TRIGger[:SOURce]:EXTernal[:SOURce]" on page 912.

For more information on the connectors and on connecting the cables, see the *E4428C/38C ESG Signal Generators User's Guide*.

- The trigger signal polarity:
  - — gating mode, see ":TRIGger:TYPE:GATE:ACTive" on page 910
  - — continuous and single modes, see ":TRIGger[:SOURce]:EXTernal:SLOPe" on page 912
- The time delay between when the ESG receives a trigger and when the waveform responds to the trigger. There are two parts to setting the delay:
  - — setting the amount of delay, see ":TRIGger[:SOURce]:EXTernal:DELay" on page 911
  - — turning the delay on, see ":TRIGger[:SOURce]:EXTernal:DELay:STATe" on page 912

BUS This choice enables triggering over the GPIB or LAN using the `*TRG` or `GET` commands or the AUXILIARY INTERFACE (RS-232) using the `*TRG` command.

***RST** KEY

Key Entry **Trigger Key** **Ext** **Bus**

:TRIGger[:SOURce]:EXTernal:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:TRIGger[:SOURce]:EXTernal:DELay <val>
[:SOURce]:RADio[:NADC]:TRIGger[:SOURce]:EXTernal:DELay?
```

This command sets the number of bits to delay the ESG's response to an external trigger.

The bit delay is a delay between when the ESG receives the trigger and when it responds to the trigger. The delay uses the clocks of the bit-clock to time the delay. After the ESG receives the trigger and the set number of delay bits (clocks) occurs, the ESG transmits the data pattern.

The delay occurs after you enable the state. See ":TRIGger[:SOURce]:EXTernal:DELay:STATe" on page 912. You can set the number of bits either before or after enabling the state.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 910.

***RST** +0

Range 0–1048575

Key Entry **Ext Delay Bits**

:TRIGger[:SOURce]:EXTernal:DELay:STATe

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:TRIGger[:SOURce]:EXTernal:DELay:STATe ON|OFF|1|0
[:SOURce]:RADio[:NADC]:TRIGger[:SOURce]:EXTernal:DELay:STATe?
```

This command enables or disables the operating state of the external trigger delay function.

For setting the delay time, see ":TRIGger[:SOURce]:EXTernal:DELay" on page 911, and for more information on configuring an external source, see":TRIGger[:SOURce]" on page 910.

***RST** 0

Key Entry **Ext Delay Off On**

:TRIGger[:SOURce]:EXTernal:SLOPe

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:TRIGger[:SOURce]:EXTernal:SLOPe POSitive|NEGative
[:SOURce]:RADio[:NADC]:TRIGger[:SOURce]:EXTernal:SLOPe?
```

This command sets the polarity for an external trigger signal while using the continuous, single triggering mode. To set the polarity for gating, see ":TRIGger:TYPE:GATE:ACTive" on page 910.

The POSitive and NEGative selections correspond to the high (positive) and low (negative) states of the external trigger signal. For example, when you select POSitive, the waveform responds (plays) during the high state of the trigger signal. When the ESG receives multiple trigger occurrences when only one is required, the signal generator uses the first trigger and ignores the rest.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 910.

***RST** POS

Key Entry **Ext Polarity Neg Pos**

:TRIGger[:SOURce]:EXTernal[:SOURce]

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC]:TRIGger[:SOURce]:EXTernal[:SOURce] EPT1|EJPT2|
EPTRIGGER1|EPTRIGGER2
[:SOURce]:RADio[:NADC]:TRIGger[:SOURce]:EXTernal[:SOURce]?
```

This command selects which PATTERN TRIG IN connection the ESG uses to accept an externally applied trigger signal when external is the trigger source selection.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 910. For more information on the rear-panel connectors, see the *E4428C/38C ESG Signal Generators User's Guide*.

The following list describes the command choices:

EPT1	This choice is synonymous with EPTRIGGER1 and selects the PATTERN TRIG IN rear-panel connector.
EPT2	This choice is synonymous with EPTRIGGER2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.
EPTRIGGER1	This choice is synonymous with EPT1 and selects the PATTERN TRIG IN rear-panel connector.
EPTRIGGER2	This choice is synonymous with EPT2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.

***RST** EPT1

Key Entry **Patt Trig In 1** **Patt Trig In 2**

[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio[:NADC][:STATe] ON|OFF|1|0
[:SOURce]:RADio[:NADC][:STATe]?
```

This command enables or disables the NADC modulation format.

***RST** OFF

Key Entry **NADC Off On**

Remarks Although the NADC modulation is enabled with this command, the RF carrier is not modulated unless you also activate the front panel **Mod On/Off** hardkey.

PDC Subsystem–Option 402 ([:SOURce]:RADio:PDC)

:ALPha

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:ALPHa <val>
[:SOURce]:RADio:PDC:ALPHa?
```

This command changes the Nyquist or root Nyquist filter's alpha value.

The filter alpha value can be set to a minimum level (0), a maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +5.00000000E–001

Range 0.000–1.000

Key Entry **Filter Alpha**

Remarks To change the current filter type, refer to ":FILTer" on page 927.

:BBCLock

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:BBCLock INT[1]|EXT[1]
[:SOURce]:RADio:PDC:BBCLock?
```

This command toggles the data (bit) clock input to the baseband generator board to either internal or external. This command is independent in each mode and works for both non-burst (continuous) and burst modes. This allows for a matrix of selections between burst/non-burst, internal/external data generation, internal/external data clock, and external bit/symbol data clock.

INT[1] This choice selects the signal generator internal data clock.

EXT[1] This choice selects an external data clock input.

***RST** INT

Key Entry **Ext Data Clock Ext Int**

Remarks A data clock or continuous symbol sync input must be supplied when external mode is used.

:BBT

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:BBT <val>
[:SOURce]:RADio:PDC:BBT?
```

This command changes the bandwidth-multiplied-by-bit-time (BbT) filter parameter.

The filter BbT value can be set to the maximum level (1) or in between the minimum level (0.100) and maximum level by using fractional numeric values (0.101–0.999).

***RST** +5.00000000E–001

Range 0.100–1.000

Key Entry **Filter BbT**

Remarks This command is effective only after choosing a Gaussian filter. It does not have an effect on other types of filters.

To change the current filter type, refer to “:FILTer” on page 927.

:BRATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:BRATe <val>
[:SOURce]:RADio:PDC:BRATe?
```

This command sets the bit rate in bits per second (bps–Mbps). The maximum bit rate is dependent on the modulation type and filter as shown in the following tables

The IQ digital data stream is shaped by a FIR filter. The filter length and associated latency and frequency response are dependent on the bit rate as shown in the following tables. The signal generator selects a filter length.

For higher bit rates, the FIR filter length may be truncated (if the minimum filter size allows it) which will impact the relative timing of the modulated data, as well as the actual filter response (see the symbol rate command “:SRATe” on page 972). Refer to “:FILTer” on page 927 for information on filter symbol widths.

To change the modulation type, refer to “:MODulation[:TYPE]” on page 930.

When the bit rate is changed, the ESG reconfigures the baseband generator. The time required to reconfigure the baseband generator is inversely proportional to the bit rate: lower bit rates require more time.

***RST** +4.20000000E+004

Range

Modulation Type	**Bit Rate Range**		
	16 Symbol Wide Filter	*32 Symbol Wide Filter*	*64 Symbol Wide Filter*
BPSK, FSK2, MSK	1bps–50Mbps	1bps–25Mbps	1bps–12.5Mbps
C4FM, OQPSK, FSK4	2bps–50Mbps	2bps–25Mbps	2bps–12.5Mbps
OQPSKI95, QPSK			
P4QPPSK, QPSKIS95			
GRAYQPSK, QAM4			
D8PSK, EDGE, FSK8, PSK8	3bps–50Mbps	3bps–25Mbps	3bps–12.5Mbps
FSK16, PSK16, QAM16	4bps–50Mbps	4bps–25Mbps	4bps–12.5Mbps
QAM32	5bps–50Mbps	5bps–25Mbps	5bps–12.5Mbps
QAM64	6bps–50Mbps	6bps–25Mbps	6bps–12.5Mbps
QAM128	7bps–50Mbps	7bps–25Mbps	7bps–12.5Mbps
QAM256	8bps–50Mbps	8bps–25Mbps	8bps–12.5Mbps

Key Entry **Symbol Rate**

:BURSt:PN9

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:BURSt:PN9 NORMal|QUICk
[:SOURce]:RADio:PDC:BURSt:PN9?
```

This command controls the software PN9 generation.

NORMal This choice produces a maximum length PN9 sequence.

QUICk This choice produces a truncated PN9 sequence.

***RST** NORM

Key Entry **PN9 Mode Normal Quick**

Remarks Use Normal mode for bit-error-rate tests where a maximum length PN9 sequence is required.

:BURSt:SHAPe:FALL:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:BURSt:SHAPe:FALL:DELay <val>
[:SOURce]:RADio:PDC:BURSt:SHAPe:FALL:DELay?
```

This command sets the period of time that the start of the burst fall is delayed.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +0.00000000E+000

Range –22.3750 to 99

Key Entry **Fall Delay**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 930. Refer to ":SRATe" on page 972 for a list of minimum and maximum symbol rate values.

":BURSt:SHAPe:FDELay" on page 919 performs the same function. In compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:FALL:TIME

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:BURSt:SHAPe:FALL:TIME <val>
[:SOURce]:RADio:PDC:BURSt:SHAPe:FALL:TIME?
```

This command sets the period of time where the burst decreases from full power to minimum power.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +1.00000000E+001

Range 0.1250–255.8750

Key Entry Fall Time

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 930. Refer to ":SRATe" on page 972 for a list of minimum and maximum symbol rate values.

":BURSt:SHAPe:FTIMe" on page 920 performs the same function. In compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:FDELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:BURSt:SHAPe:FDELay <val>
[:SOURce]:RADio:PDC:BURSt:SHAPe:FDELay?
```

This command sets the period of time that the start of the burst fall is delayed.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +0.00000000E+000

Range –22.3750 to 99

Key Entry **Fall Delay**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 930. Refer to ":SRATe" on page 972 for a list of minimum and maximum symbol rate values.

":BURSt:SHAPe:FALL:DELay" on page 918 performs the same function. In compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:FTIMe

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:BURSt:SHAPe:FTIMe <val>
[:SOURce]:RADio:PDC:BURSt:SHAPe:FTIMe?
```

This command sets the period of time where the burst decreases from full power to minimum power.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +0.00000000E+000

Range 0.1250–255.8750

Key Entry **Fall Time**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 930. Refer to ":SRATe" on page 972 for a list of minimum and maximum symbol rate values.

":BURSt:SHAPe:FALL:TIME" on page 918 performs the same function. In compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:RDELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:BURSt:SHAPe:RDELay <val>
[:SOURce]:RADio:PDC:BURSt:SHAPe:RDELay?
```

This command sets the period of time that the start of the burst rise is delayed.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +0.00000000E+000

Range –18.3750 to 99

Key Entry **Rise Delay**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 930. Refer to ":SRATe" on page 972 for a list of minimum and maximum symbol rate values.

":BURSt:SHAPe:RISE:DELay" on page 921 performs the same function. In compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:RISE:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:BURSt:SHAPe:RISE:DELay <val>
[:SOURce]:RADio:PDC:BURSt:SHAPe:RISE:DELay?
```

This command sets the period of time that the start of the burst rise is delayed.

The variable <val> is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +0.00000000E+000

Range –18.3750 to 99

Key Entry **Rise Delay**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 930. Refer to ":SRATe" on page 972 for a list of minimum and maximum symbol rate values.

":BURSt:SHAPe:RDELay" on page 920 performs the same function. In compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:RISE:TIME

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:BURSt:SHAPe:RISE:TIME <val>
[:SOURce]:RADio:PDC:BURSt:SHAPe:RISE:TIME?
```

This command sets the period of time where the burst increases from a minimum power to full power.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +1.00000000E+001

Range 0.1250–22.5000

Key Entry **Rise Time**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 930. Refer to ":SRATe" on page 972 for a list of minimum and maximum symbol rate values.

":BURSt:SHAPe:RTIMe" on page 922 performs the same function. In compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:RTIMe

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:BURSt:SHAPe:RTIMe <val>
[:SOURce]:RADio:PDC:BURSt:SHAPe:RTIMe?
```

This command sets the period of time where the burst increases from a minimum power to full power.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +1.00000000E+001

Range 0.1250–22.5000

Key Entry **Rise Time**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 930. Refer to ":SRATe" on page 972 for a list of minimum and maximum symbol rate values.

":BURSt:SHAPe:RISE:TIME" on page 922 performs the same function. In compliance with the SCPI standard, both commands are listed.

Refer to the *E4428C/38C ESG Signal Generators User's Guide* for concept information.

:BURSt:SHAPe[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:BURSt:SHAPe[:TYPE] SINE|"<file name>"
[:SOURce]:RADio:PDC:BURSt:SHAPe[:TYPE]?
```

This command specifies the burst shape as either `SINE` or a user-defined file (`"<file name>"`).

SINE This choice selects a state that is defined by the burst rise and fall *RST values, as the default burst shape type.

`"<file name>"` This choice selects a user designated file from signal generator memory.

***RST** SINE

Key Entry **Sine** **User File**

:BURSt[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:BURSt[:STATe] ON|OFF|1|0
[:SOURce]:RADio:PDC:BURSt[:STATe]?
```

This command enables or disables the burst function.

ON (1) This choice enables the transmission of framed data. If all timeslots which are switched on are up traffic channels or custom, you will be bursting the timeslots that are on; there will be no RF carrier during the off timeslots.

If you have switched on any timeslot that you have configured as a down traffic channel, the RF carrier is not switched off between any of the timeslots. The off timeslots are transmitted as a continuous series of ones for the time period of the off timeslots.

OFF (0)	This choice enables the transmission of unframed data.
***RST**	0
Key Entry	**Data Format Pattern Framed**

:CHANnel

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:CHANnel EVM|ACP
[:SOURce]:RADio:PDC:CHANnel?
```

This command optimizes the Nyquist and root Nyquist filters to minimize error vector magnitude (EVM) or to minimize adjacent channel power (ACP).

EVM	This choice provides the most ideal passband.
ACP	This choice improves stopband rejection.
***RST**	EVM
Key Entry	**Optimize FIR For EVM ACP**
Remarks	To change the current filter type, refer to ":FILTer" on page 927.

:DATA

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:DATA PN9|PN11|PN15|PN20|PN23|FIX4|"<file name>"|
EXT|P4|P8|P16|P32|P64|PRAM
[:SOURce]:RADio:PDC:DATA?
```

This command sets the data pattern type (pseudo-random number sequence, 4-bit pattern, sequence of 1's and 0's, data from an external source, or a user file) for unframed data transmission.

***RST**	PN23
Key Entry	**PN9 PN11 PN15 PN20 PN23 FIX4 User File Ext**
	4 1's & 4 0's 8 1's & 8 0's 16 1's & 16 0's 32 1's & 32 0's
	64 1's & 64 0's PRAM File
Remarks	Refer to "File Name Variables" on page 13 for information on the file name syntax.

:DATA:PRAM

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:DATA:PRAM "<file_name>"
[:SOURce]:RADio:PDC:DATA:PRAM?
```

This command selects a pattern RAM (PRAM) file as the pattern data type for the PDC (Personal Digital Cellular) format.

`"<file_name>"` This variable designates the PRAM file in WFM1. Refer to "File Name Variables" on page 13 for information on the file name syntax.

Key Entry **PRAM File**

Remarks Selecting this data source forces the burst source to `INTernal` to allow framing control.

The PRAM file must reside in the ESG's volatile memory (WFM1) in order to be accessed by this command. See ":DATA:PRAM:FILE:BLOCk" on page 112.

:DATA:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:DATA:FIX4 <val>
[:SOURce]:RADio:PDC:DATA:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern for unframed transmission according to the protocols (modulation type, symbol rate, filter, and burst shape) selected for the PDC format.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks `FIX4` must already be defined as the data type.

:DEFault

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:DEFault
```

This command returns all of the PDC modulation format parameters to factory settings. It does not affect any other signal generator parameters.

Key Entry **Restore PDC Factory Default**

:EDATa:DELay

Supported E4438C with Option 402

`[:SOURce]:RADio:PDC:EDATa:DELay?`

This query returns the amount of delay (in symbols) from the external data input to the beginning of the symbol on the I OUT and Q OUT rear panel connectors and the front panel RF OUTPUT connector.

Remarks When the format is turned off, the delay value is unchanged; the query will return the same delay value if the format is on or off.

:EDCLock

Supported E4438C with Option 402

`[:SOURce]:RADio:PDC:EDCLock SYMBol|NORMal`
`[:SOURce]:RADio:PDC:EDCLock?`

This command sets the external data clock use.

SYMBol This choice specifies that a continuous symbol clock signal must be provided to the SYMBOL SYNC input connector.

NORMal This choice specifies that the DATA CLOCK input connector requires a bit clock. The SYMBOL SYNC input connector requires a (one-shot or continuous) symbol sync signal.

***RST** NORM

Key Entry **Ext Data Clock Normal Symbol**

Remarks Both choices have no effect in internal clock mode. Refer to ":BBCLock" on page 915 to select EXT as the data clock type.

:EREFerence

Supported E4438C with Option 402

`[:SOURce]:RADio:PDC:EREFerence INT|EXT`
`[:SOURce]:RADio:PDC:EREFerence?`

This command selects either an internal or external bit-clock reference for the data generator.

***RST** INT

Key Entry **BBG Ref Ext Int**

Remarks If the EXT choice is selected, the external source's frequency value must be applied to the BASEBAND GEN REF IN rear panel connector. The external reference and external data clock are not applicable at the same time. If both are selected, then the external reference takes precedence.

Refer to, ":EREFerence:VALue" on page 927 to enter the external reference frequency setting.

:EREFerence:VALue

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:EREFerence:VALue <val>
[:SOURce]:RADio:PDC:EREFerence:VALue?
```

This command sets the expected bit-clock reference frequency value for an externally applied reference signal.

The variable `<val>` is expressed in units of hertz (Hz–MHz).

***RST** +1.30000000E+007

Range 2.5E5–1E8

Key Entry **Ext BBG Ref Freq**

Remarks The value specified by this command is effective only when you are using an external reference applied to the BASEBAND GEN REF IN rear panel connector.

Refer to ":EREFerence" on page 926 to select EXT (external source) as the reference for the bit-clock.

:FILTer

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:FILTer RNYQuist|NYQuist|GAUSsian|RECTangle|
IS95|IS95_EQ|IS95_MOD|IS95_MOD_EQ|AC4Fm|UGGaussian|"<user FIR>"
[:SOURce]:RADio:PDC:FILTer?
```

This command selects the pre-modulation filter type.

IS95 This choice selects a filter that meets the criteria of the IS-95 standard.

IS95_EQ This choice selects a filter which is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard. This filter is only used for IS-95 baseband filtering.

IS95_MOD This choice selects a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the

	filter specified in the IS-95 standard.
IS95_MOD_EQ	This choice selects a filter which is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance), with lower passband rejection.
AC4Fm	Selects a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.
UGGaussian	This choice selects a backwards compatible GSM Gaussian filter (Gaussian filter with a fixed BbT value of 0.300) for the ESG E44xxB Option UN3 or UN4.
`"<user FIR>"`	This variable is any filter file that you have stored into memory.
***RST**	RYNQ
Key Entry	**Root Nyquist** **Nyquist** **Gaussian** **Rectangle** **IS-95** **IS-95 w/EQ** **IS-95 Mod** **IS-95 Mod w/EQ** **APCO 25 C4FM** **UN3/4 GSM Gaussian** **User FIR**
Remarks	Refer to "File Name Variables" on page 13 for information on the file name syntax.

:FRATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:FRATe FULL|HALF
[:SOURce]:RADio:PDC:FRATe?
```

This command toggles between a full- or half-rate traffic channel.

FULL	Selects two equally spaced timeslots of the frame. Since there are six timeslots per frame, timeslots 1, 2, and 3 are paired with timeslots 4, 5, and 6, respectively.
HALF	Selects one timeslot of the frame (6 individual timeslots per frame).
***RST**	FULL
Key Entry	**Rate Full Half**

:IQ:SCALe

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:IQ:SCALe <val>
[:SOURce]:RADio:PDC:IQ:SCALe?
```

This command sets the amplitude of the I/Q outputs for better adjacent channel power (ACP); lower scaling values equate to better ACP.

The variable `<val>` is expressed in units of percent.

***RST** +100

Range 1–200

Key Entry **I/Q Scaling**

Remarks This command has no effect with MSK or FSK modulation.

:MODulation:FSK[:DEViation]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:MODulation:FSK[:DEViation] <val>
[:SOURce]:RADio:PDC:MODulation:FSK[:DEViation]?
```

This command sets the symmetric FSK frequency deviation value.

The variable `<val>` is expressed in units of Hertz and the maximum range value equals the current symbol rate value multiplied by four, limited to 20 MHz.

***RST** +4.00000000E+002

Range 0–2E7

Key Entry **Freq Dev**

Remarks To change the modulation type, refer to “:MODulation[:TYPE]” on page 930.

Refer to “:SRATe” on page 972 for minimum and maximum symbol rate values.

To set an asymmetric FSK deviation value, refer to the *E4428C/38C ESG Signal Generators User’s Guide* for more information.

:MODulation:MSK[:PHASe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:MODulation:MSK[:PHASe] <val>
[:SOURce]:RADio:PDC:MODulation:MSK[:PHASe]?
```

This command sets the MSK phase deviation value.

The variable `<val>` is expressed in units of degrees.

***RST** +9.00000000E+001

Range 0–100

Key Entry **Phase Dev**

:MODulation:UFSK

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:MODulation:UFSK "<file name>"
[:SOURce]:RADio:PDC:MODulation:UFSK?
```

This command selects a user-defined FSK file from the signal generator memory.

Key Entry **User FSK**

Remarks The user-defined FSK file is held in signal generator memory until the command that selects user FSK as the modulation type is sent. Refer to ":MODulation[:TYPE]" on page 930 to change the current modulation type.

Refer to "File Name Variables" on page 13 for information on the file name syntax.

:MODulation:UIQ

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:MODulation:UIQ "<file name>"
[:SOURce]:RADio:PDC:MODulation:UIQ?
```

This command selects a user-defined I/Q file from the signal generator memory.

Key Entry **User I/Q**

Remarks The user-defined I/Q file is held in signal generator memory until the command that selects user I/Q as the modulation type is sent. Refer to ":MODulation[:TYPE]" on page 930 to change the current modulation type.

Refer to "File Name Variables" on page 13 for information on the file name syntax.

:MODulation[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:MODulation[:TYPE] BPSK|QPSK|IS95QPSK|
GRAYQPSK|OQPSK|IS95OQPSK|P4DQPSK|PSK8|PSK16|D8PSK|MSK|
FSK2|FSK4|FSK8|FSK16|C4FM|QAM4|QAM16|QAM32|QAM64|QAM128|QAM256|UIQ|UFSK
[:SOURce]:RADio:PDC:MODulation[:TYPE]?
```

This command sets the modulation type for the PDC personality.

***RST**	P4DQPSK
Key Entry	**BPSK** **QPSK** **IS-95 QPSK** **Gray Coded QPSK** **OQPSK** **IS-95 OQPSK** **π/4 DQPSK** **8PSK** **16PSK** **D8PSK** **MSK** **2-Lvl FSK** **4-Lvl FSK** **8-Lvl FSK** **16-Lvl FSK** **C4FM** **4QAM** **16QAM** **32QAM** **64QAM** **128QAM** **256QAM** **User I/Q** **User FSK**

:POLarity[:ALL]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:POLarity[:ALL] NORMal|INVerted
[:SOURce]:RADio:PDC:POLarity[:ALL]?
```

This command sets the rotation direction for of the phase modulation vector.

NORMal	This choice selects normal phase polarity.
INVerted	This choice inverts the internal Q signal.
***RST**	NORM
Key Entry	**Phase Polarity Normal Invert**

:SECondary:RECall

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SECondary:RECall
```

This command recalls the secondary frame configuration, overwriting the current state.

Key Entry	**Recall Secondary Frame State**
Remarks	To save a secondary frame state, refer to “:SECondary:SAVE” on page 931.
	A secondary frame is not active until the secondary state is enabled. To activate a secondary frame, refer to “:SECondary[:STATe]” on page 932.

:SECondary:SAVE

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SECondary:SAVE
```

This command saves the current frame configuration as the secondary frame with the filename `PDC_SECONDARY_FRAME`.

Key Entry **Save Secondary Frame State**

Remarks To recall the secondary frame (saved in non-volatile signal generator memory), refer to ":SECondary:SAVE" on page 931.

:SECondary:TRIGger[:SOURce]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SECondary:TRIGger[:SOURce] KEY|EXT|BUS
[:SOURce]:RADio:PDC:SECondary:TRIGger[:SOURce]?
```

This command selects the type of triggering for the secondary frame.

KEY This choice enables triggering by pressing the front panel **Trigger** hardkey.

EXT This choice enables triggering using an externally applied signal at the PATT TRIG IN rear panel connector or the PATT TRIG IN 2 pin on the rear panel AUX I/O connector. To select the appropriate connector, refer to ":TRIGger[:SOURce]:EXTernal[:SOURce]" on page 947.

BUS This choice enables GPIB triggering using the `*TRG` or `GET` command or LAN and RS-232 triggering using the `*TRG` command.

Key Entry **Trigger Key** **Ext** **Bus**

:SECondary[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SECondary[:STATe] ON|OFF|1|0
[:SOURce]:RADio:PDC:SECondary[:STATe]?
```

This command enables or disables the ability to switch to the secondary frame.

***RST** 0

Key Entry **Secondary Frame Off On**

Remarks A frame must already be saved as the secondary frame in order to turn the secondary state function on.

To save a frame as the secondary frame, refer to ":SECondary[:STATe]" on page 932.

:SLOT0|[1]|2|3|4|5:DCUStom

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:DCUStom PN9|PN11|PN15|
PN20|PN23|FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:DCUStom?
```

This command configures the data field for the selected downlink custom timeslot.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1's & 4 0's **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's**

64 1's & 64 0's

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:SLOT0|[1]|2|3|4|5:DCUSTom:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:DCUStom:FIX4 <val>
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:DCUStom:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected downlink custom timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type. To change the data type, refer to ":SLOT0|[1]|2|3|4|5:DCUStom" on page 933.

:SLOT0|[1]|2|3|4|5:DTCHannel:CCODe

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:DTCHannel:CCODe <bit_pattern>
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:DTCHannel:CCODe?
```

This command changes the 8-bit color code (CC). The preset hexadecimal value (when normal preset is selected) for CC reflects the PDC protocol, however you can enter a new value using this command.

***RST** #H00

Range #H00–#HFF

Key Entry **CC**

:SLOT0|[1]|2|3|4|5:DTCHannel:SACChannel

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:DTCHannel:SACChannel <bit_pattern>
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:DTCHannel:SACChannel?
```

This command changes the 15-bit slow associated control channel (SACCH). The preset hexadecimal value (when normal preset is selected) for SACCH reflects the PDC protocol, however you can enter a new value by executing this command.

***RST** #H00000

Range #H0–#HFFFFF

Key Entry **SACCH**

:SLOT0|[1]|2|3|4|5:DTCHannel:SWORd

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:DTCHannel:SWORd <bit_pattern>
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:DTCHannel:SWORd?
```

This command sets the 20-bit synchronization word as the active function. This is used for the control and traffic physical channels.

***RST** #H87A4B

Range #H0–#HFFFFF

Key Entry **SW**

:SLOT0|[1]|2|3|4|5:DTCHannel[:TCHannel]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:DTCHannel[:TCHannel] PN9|
PN11|PN15|PN20|PN23|FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:DTCHannel[:TCHannel]?
```

This command configures the data field for the selected downlink traffic channel field.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1's & 4 0's **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's**

64 1's & 64 0's

Remarks See "File Name Variables" on page 13 for information on the file name syntax.

:SLOT0|[1]|2|3|4|5:DTCHannel[:TCHannel]:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:DTCHannel[:TCHannel]:FIX4 <val>
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:DTCHannel[:TCHannel]:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected downlink traffic channel timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks `FIX4` must already be defined as the data type.

:SLOT0|[1]|2|3|4:POWer

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:DLINk:SLOT0|[1]|2|3|4:POWer MAIN|DELTa
[:SOURce]:RADio:PDC:DLINk:SLOT0|[1]|2|3|4:POWer?
```

This command toggles the RF output power level function for the selected timeslot.

MAIN This choice specifies RF output as the main power level.

DELTa This choice specifies RF output as the alternative power level.

***RST** MAIN

Key Entry **Timeslot Ampl Main Delta**

:SLOT0|[1]|2|3|4|5:STATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:STATe ON|OFF|1|0
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:STATe?
```

This command enables or disables the operating state of the selected timeslot.

***RST** Timeslot 0: 1 Timeslots 1–5: 0

Key Entry **Timeslot Off On**

:SLOT0|[1]|2|3|4|5:UCUStom

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:UCUStom PN9|PN11|PN15|
PN20|PN23|FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:UCUStom?
```

This command configures the data field for the selected uplink custom timeslot.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1’s & 4 0’s **8 1’s & 8 0’s** **16 1’s & 16 0’s** **32 1’s & 32 0’s**

64 1’s & 64 0’s

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:SLOT0|[1]|2|3|4|5:UCUStom:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:UCUStom:FIX4 <val>
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:UCUStom:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected uplink custom timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks `FIX4` must already be defined as the data type.

:SLOT0|[1]|2|3|4|5:UTCHannel:CCODe

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:UTCHannel:CCODe <bit_pattern>
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:UTCHannel:CCODe?
```

This command changes the 8-bit color code (CC). The preset hexadecimal value (when normal preset is selected) for CC reflects the PDC protocol, however you can enter a new value using this command.

***RST** #H00

Range #H00–#HFF

Key Entry **CC**

:SLOT0|[1]|2|3|4|5:UTCHannel:SACChannel

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:UTCHannel:SACChannel <bit_pattern>
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:UTCHannel:SACChannel?
```

This command changes the 15-bit slow associated control channel (SACCH). The preset hexadecimal value (when normal preset is selected) for SACCH reflects the PDC protocol, however you can enter a new value by executing this command.

***RST** #H0000

Range #H0–#H7FFF

Key Entry **SACCH**

:SLOT0|[1]|2|3|4|5:UTCHannel:SWORd

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:UTCHannel:SWORd <bit_pattern>
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:UTCHannel:SWORd?
```

This command sets the 20-bit synchronization word as the active function. This is used for the control and traffic physical channels.

***RST** #H785B4

Range #H0–#HFFFFF

Key Entry **SW**

:SLOT0|[1]|2|3|4|5:UTCHannel[:TCHannel]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:UTCHannel[:TCHannel] PN9|
PN11|PN15|PN20|PN23|FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:UTCHannel[:TCHannel]?
```

This command sets a pseudo-random number sequence, 4-bit pattern, sequence of 1’s and 0’s, data from an external source, or a user file as the data pattern type for the uplink traffic channel field.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1’s & 4 0’s **8 1’s & 8 0’s** **16 1’s & 16 0’s** **32 1’s & 32 0’s**

64 1’s & 64 0’s

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:SLOT0|[1]|2|3|4|5:UTCHannel[:TCHannel]:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:UTCHannel[:TCHannel]:FIX4 <val>
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:UTCHannel[:TCHannel]:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected uplink traffic channel timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks `FIX4` must already be defined as the data type.

:SLOT0|[1]|2|3|4|5:UVOX:CCODe

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:UVOX:CCODe <bit_pattern>
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:UVOX:CCODe?
```

This command changes the 8-bit color code (CC). The preset hexadecimal value (when normal preset is selected) for CC reflects the PDC protocol, however you can enter a new value using this command.

***RST** #H00

Range #H00–#HFF

Key Entry **CC**

:SLOT0|[1]|2|3|4|5:UVOX:SACChannel

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:UVOX:SACChannel <bit_pattern>
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:UVOX:SACChannel?
```

This command changes the 15-bit slow associated control channel (SACCH). The preset hexadecimal value (when normal preset is selected) for SACCH reflects the PDC protocol, however you can enter a new value by executing this command.

***RST** #H0000

Range #H0–#H7FFF

Key Entry **SACCH**

:SLOT0|[1]|2|3|4|5:UVOX:SWORd

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:UVOX:SWORd <bit_pattern>
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5:UVOX:SWORd?
```

This command changes the synchronization word, which is used for slot synchronization, equalizer training, and timeslot identification.

***RST** UTCH & UVOX: 785B4 DTCH: 87A4B

Range #H0–#HFFFFF

Key Entry **SW**

Remarks The *RST hexadecimal value reflects the value specified by the indicated standard.

:SLOT0|[1]|2|3|4|5[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5[:TYPE] UCUStom|DCUStom|
UTCH|UTCH_ALL|UVOX|DTCH|DTCH_ALL
[:SOURce]:RADio:PDC:SLOT0|[1]|2|3|4|5[:TYPE]?
```

This command sets the timeslot type for the selected timeslot.

***RST** UTCH

Key Entry **Up Custom** **Down Custom** **Up TCH** **UP TCH All** **Up VOX** **Down TCH** **Down TCH All**

:SOUT

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SOUT FRAME|SLOT|ALL
[:SOURce]:RADio:PDC:SOUT?
```

This command sets the synchronization location (within the pattern of data) and the type of output at the EVENT 1 rear panel connector.

FRAME This choice outputs a 1-bit signal, synchronized to the bit selected by the synchronization output offset command, for a framed data pattern.

SLOT This choice outputs a 1-bit signal, synchronized to the bit selected by the synchronization output offset command, for a selected timeslot.

ALL This choice outputs a 1-bit signal, synchronized to the bit selected by the synchronization output offset command, for all active timeslots.

***RST** FRAME

Key Entry **Begin Frame** **Begin Timeslot #** **All Timeslots**

:SOUT:OFFSet

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SOUT:OFFSet <val>
[:SOURce]:RADio:PDC:SOUT:OFFSet?
```

This command sets the offset value for the location of the output synchronization signal on the EVENT1 rear panel connector relative to the beginning of the framed data pattern or timeslot.

The variable `<val>` is expressed as a number bits.

***RST** +0

Range –279 to 279

Key Entry **Sync Out Offset**

Remarks Negative values move the synchronization output signal earlier; positive values move it later.

To change the output of the EVENT1 rear panel connector to SLOT, refer to ":SOUT" on page 940.

:SOUT:SLOT

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SOUT:SLOT <val>
[:SOURce]:RADio:PDC:SOUT:SLOT?
```

This command selects the timeslot that will trigger a 1-bit signal at the EVENT 1 rear panel connector.

***RST** +0

Range 0–5

Key Entry **Begin Timeslot #**

Remarks To change the output of the EVENT1 rear panel connector to SLOT, refer to ":SOUT" on page 940.

:SRATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:SRATe <val>
[:SOURce]:RADio:PDC:SRATe?
```

This command sets the transmission symbol rate. Symbol rate is the bit rate divided by the bits per symbol. A change in the symbol rate affects the bit rate. Refer to ":BRATe" on page 780 for information on bit rate.

The variable `<val>` is expressed in units of symbols per second (sps–Msps) and the maximum symbol rate depends on the filter. Refer to ":FILTer" on page 927 for minimum filter symbol width.

The filter may have to be truncated down to 32 or 16 symbols wide to achieve the highest symbol rate. The signal generator's internal filters are not truncated below their minimum filter length and user-defined FIR filters are not truncated. If the filter cannot be truncated then the symbol rate is limited to the maximum rate of the narrowest filter size possible.

The relative timing of the modulated data, as well as the actual filter response is affected when the filter is truncated.

When the symbol rate changes, the ESG reconfigures the baseband generator. The time required to reconfigure the baseband generator is inversely proportional to the symbol rate: lower symbol rates require more time.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 930.

***RST** +2.10000000E+004

Range

Modulation Type	**Symbol Rate Range**		
	16 Symbol Wide Filter	*32 Symbol Wide Filter*	*64 Symbol Wide Filter*
BPSK, FSK2, MSK	1sps–50Msps	1sps–25Msps	1sps–12.5Msps
C4FM, OQPSK, FSK4	2sps–25Msps	2sps–12.5Msps	2sps–6.25Msps
OQPSKI95, QPSK			
P4QPPSK, QPSKIS95			
GRAYQPSK, QAM4			
D8PSK, EDGE, FSK8, PSK8	3sps–16.666666666 Msps	3sps–8.333333333 Msps	3sps–4.166666666Msps
FSK16, PSK16, QAM16	4sps–12.5Msps	4sps–6.25Msps	4sps–3.125Msps
QAM32	5sps–10Msps	5sps–5Msps	5sps–2.5Msps
QAM64	6sps–8.333333333 Msps	6sps–4.166666666 Msps	6sps–2.083333333 Msps
QAM128	7sps–7.142857142 Msps	7sps–3.571428572 Msps	7sps–1.785714285 Msps
QAM256	8sps–6.25Msps	8sps–3.125 Msps	8sps–1.5625 Msps

NOTE Using I/Q skew will half the minimum number of symbols for the selected filter.

Key Entry **Symbol Rate**

:TRIGger:TYPE

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:TRIGger:TYPE CONTinuous|SINGle|GATE
[:SOURce]:RADio:PDC:TRIGger:TYPE?
```

This command sets the trigger type.

CONTinuous — The framed data sequence repeats continuously; the sequence restarts every time the previous playback is completed. To customize continuous triggering, refer to ":TRIGger:TYPE:CONTinuous[:TYPE]" on page 943.

SINGle — The framed data sequence plays once for every trigger received.

GATE — An external trigger signal interrupts the playback while the gating signal is in the inactive state. Playback resumes when the external control signal returns to the active state. The active state can be set to high or low.

***RST** CONT

Key Entry **Continuous** **Single** **Gated**

:TRIGger:TYPE:CONTinuous[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:TRIGger:TYPE:CONTinuous[:TYPE] FREE|TRIGger|RESet
[:SOURce]:RADio:PDC:TRIGger:TYPE:CONTinuous[:TYPE]?
```

This commands selects the waveform's response to a trigger signal while using the continuous trigger mode.

For more information on triggering and to select the continuous trigger mode, see ":TRIGger:TYPE" on page 943.

The following list describes the waveform's response to each of the command choices:

FREE — Turning the ARB format on immediately triggers the waveform. The waveform repeats until you turn the format off, select another trigger, or choose another waveform file.

TRIGger — The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously until you turn the format off, select another trigger, or choose another waveform file.

RESet — The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously. Subsequent triggers reset the waveform to the beginning. For a waveform sequence, this means to the beginning of the first segment in the sequence.

***RST** FREE

Key Entry **Free Run** **Trigger & Run** **Reset & Run**

:TRIGger:TYPE:GATE:ACTive

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:TRIGger:TYPE:GATE:ACTive LOW|HIGH
[:SOURce]:RADio:PDC:TRIGger:TYPE:GATE:ACTive?
```

This command selects the active state (gate polarity) of the gate while using the gating trigger mode.

The LOW and HIGH selections correspond to the low and high states of an external trigger signal. For example, when you select HIGH, the active state occurs during the high of the trigger signal. When the active state occurs, the ESG stops the waveform playback at the last played sample point, then restarts the playback at the next sample point when the inactive state occurs. For more information on triggering and to select gating as the trigger mode, see ":TRIGger:TYPE" on page 943.

The following list describes the ESG's gating behavior for the polarity selections:

LOW The waveform playback stops when the trigger signal goes low (active state) and restarts when the trigger signal goes high (inactive state).

HIGH The waveform playback stops when the trigger signal goes high (active state) and restarts when the trigger signal goes low (inactive state).

***RST** HIGH

Key Entry **Gate Active Low High**

:TRIGger[:SOURce]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:TRIGger[:SOURce] KEY|EXT|BUS
[:SOURce]:RADio:PDC:TRIGger[:SOURce]?
```

This command sets the trigger source.

For more information on triggering, see ":TRIGger:TYPE" on page 943. The following list describes the command choices:

KEY This choice enables manual triggering by pressing the front-panel **Trigger** hardkey.

EXT — An externally applied signal triggers the waveform. This is the only choice that works with gating. The following conditions affect an external trigger:

- The input connector selected for the trigger signal. You have a choice between the rear-panel PATTERN TRIG IN connector or the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector. To make the connector selection, see ":TRIGger[:SOURce]:EXTernal[:SOURce]" on page 947.

  For more information on the connectors and on connecting the cables, see the *E4428C/38C ESG Signal Generators User's Guide*.

- The trigger signal polarity:
  - gating mode, see ":TRIGger:TYPE:GATE:ACTive" on page 944
  - continuous and single modes, see ":TRIGger[:SOURce]:EXTernal:SLOPe" on page 946

- The time delay between when the ESG receives a trigger and when the waveform responds to the trigger. There are two parts to setting the delay:
  - setting the amount of delay, see ":TRIGger[:SOURce]:EXTernal:DELay" on page 945
  - turning the delay on, see ":TRIGger[:SOURce]:EXTernal:DELay:STATe" on page 946

BUS — This choice enables triggering over the GPIB or LAN using the `*TRG` or `GET` commands or the AUXILIARY INTERFACE (RS-232) using the `*TRG` command.

***RST** KEY

Key Entry **Trigger Key** **Ext** **Bus**

:TRIGger[:SOURce]:EXTernal:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:TRIGger[:SOURce]:EXTernal:DELay <val>
[:SOURce]:RADio:PDC:TRIGger[:SOURce]:EXTernal:DELay?
```

This command sets the number of bits to delay the ESG's response to an external trigger.

The bit delay is a delay between when the ESG receives the trigger and when it responds to the trigger. The delay uses the clocks of the bit-clock to time the delay. After the ESG receives the trigger and the set number of delay bits (clocks) occurs, the ESG transmits the data pattern.

The delay occurs after you enable the state. See ":TRIGger[:SOURce]:EXTernal:DELay:STATe" on page 946. You can set the number of bits either before or after enabling the state.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 944.

***RST** +0

Range 0–1048575

Key Entry **Ext Delay Bits**

:TRIGger[:SOURce]:EXTernal:DELay:STATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:TRIGger[:SOURce]:EXTernal:DELay:STATe ON|OFF|1|0
[:SOURce]:RADio:PDC:TRIGger[:SOURce]:EXTernal:DELay:STATe?
```

This command enables or disables the operating state of the external trigger delay function.

For setting the delay time, see ":TRIGger[:SOURce]:EXTernal:DELay" on page 945, and for more information on configuring an external source, see":TRIGger[:SOURce]" on page 944.

***RST** 0

Key Entry **Ext Delay Off On**

:TRIGger[:SOURce]:EXTernal:SLOPe

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:TRIGger[:SOURce]:EXTernal:SLOPe POSitive|NEGative
[:SOURce]:RADio:PDC:TRIGger[:SOURce]:EXTernal:SLOPe?
```

This command sets the polarity for an external trigger signal while using the continuous, single triggering mode. To set the polarity for gating, see ":TRIGger:TYPE:GATE:ACTive" on page 944.

The POSitive and NEGative selections correspond to the high (positive) and low (negative) states of the external trigger signal. For example, when you select POSitive, the waveform responds (plays) during the high state of the trigger signal. When the ESG receives multiple trigger occurrences when only one is required, the signal generator uses the first trigger and ignores the rest.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 944.

***RST** NEG

Key Entry **Ext Polarity Neg Pos**

:TRIGger[:SOURce]:EXTernal[:SOURce]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC:TRIGger[:SOURce]:EXTernal[:SOURce] EPT1|EPT2|
EPTRIGGER1|EPTRIGGER2
[:SOURce]:RADio:PDC:TRIGger[:SOURce]:EXTernal[:SOURce]?
```

This command selects which PATTERN TRIG IN connection the ESG uses to accept an externally applied trigger signal when external is the trigger source selection.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 944. For more information on the rear-panel connectors, see the *E4428C/38C ESG Signal Generators User's Guide*.

The following list describes the command choices:

EPT1 This choice is synonymous with EPTRIGGER1 and selects the PATTERN TRIG IN rear-panel connector.

EPT2 This choice is synonymous with EPTRIGGER2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.

EPTRIGGER1 This choice is synonymous with EPT1 and selects the PATTERN TRIG IN rear-panel connector.

EPTRIGGER2 This choice is synonymous with EPT2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.

***RST** EPT1

Key Entry **Patt Trig In 1** **Patt Trig In 2**

[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PDC[:STATe] ON|OFF|1|0 [:SOURce]:RADio:PDC[:STATe]?
```

This command enables or disables the PDC modulation format.

***RST** OFF

Key Entry **PDC Off On**

Remarks Although the PDC modulation is enabled with this command, the RF carrier is not modulated unless you also activate the front panel **Mod On/Off** hardkey.

PHS Subsystem–Option 402 ([:SOURce]:RADio:PHS)

:ALPha

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:ALPHa <val>
[:SOURce]:RADio:PHS:ALPHa?
```

This command changes the Nyquist or root Nyquist filter's alpha value.

The filter alpha value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +5.00000000E–001

Range 0.000–1.000

Key Entry **Filter Alpha**

Remarks To change the current filter type, refer to ":FILTer" on page 966.

:BBCLock

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:BBCLock INT[1]|EXT[1]
[:SOURce]:RADio:PHS:BBCLock?
```

This command toggles the data (bit) clock input to the baseband generator board to either internal or external. This command is independent in each mode and works for both non-burst (continuous) and burst modes. This allows for a matrix of selections between burst/non-burst, internal/external data generation, internal/external data clock, and external bit/symbol data clock.

INT[1] This choice selects the signal generator internal data clock.

EXT[1] This choice selects an external data clock input.

***RST** INT

Key Entry **BBG Data Clock Ext Int**

Remarks A data clock or continuous symbol sync input must be supplied when external mode is used.

:BBT

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:BBT <val>
[:SOURce]:RADio:PHS:BBT?
```

This command changes the bandwidth-multiplied-by-bit-time (BbT) filter parameter.

The filter BbT value can be set to the maximum level (1) or in between the minimum level (0.100) and maximum level by using fractional numeric values (0.101–0.999).

***RST** +5.00000000E–001

Range 0.100–1.000

Key Entry **Filter BbT**

Remarks This command is effective only after choosing a Gaussian filter. It does not have an effect on other types of filters.

To change the current filter type, refer to “:FILTer” on page 966.

:BRATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:BRATe <val>
[:SOURce]:RADio:PHS:BRATe?
```

This command sets the bit rate in bits per second (bps–Mbps). The maximum bit rate is dependent on the modulation type and filter as shown in the following tables

The IQ digital data stream is shaped by a FIR filter. The filter length and associated latency and frequency response are dependent on the bit rate as shown in the following tables. The signal generator selects a filter length.

For higher bit rates, the FIR filter length may be truncated (if the minimum filter size allows it) which will impact the relative timing of the modulated data, as well as the actual filter response (see the symbol rate command “:SRATe” on page 972). Refer to “:FILTer” on page 966 for information on filter symbol widths.

To change the modulation type, refer to “:MODulation[:TYPE]” on page 969.

When the bit rate is changed, the ESG reconfigures the baseband generator. The time required to reconfigure the baseband generator is inversely proportional to the bit rate: lower bit rates require more time.

***RST** +3.84000000E+005

Range

Modulation Type	Bit Rate Range		
	16 Symbol Wide Filter	*32 Symbol Wide Filter*	*64 Symbol Wide Filter*
BPSK, FSK2, MSK	1bps–50Mbps	1bps–25Mbps	1bps–12.5Mbps
C4FM, OQPSK, FSK4 OQPSKI95, QPSK P4QPPSK, QPSKIS95 GRAYQPSK, QAM4	2bps–50Mbps	2bps–25Mbps	2bps–12.5Mbps
D8PSK, EDGE, FSK8, PSK8	3bps–50Mbps	3bps–25Mbps	3bps–12.5Mbps
FSK16, PSK16, QAM16	4bps–50Mbps	4bps–25Mbps	4bps–12.5Mbps
QAM32	5bps–50Mbps	5bps–25Mbps	5bps–12.5Mbps
QAM64	6bps–50Mbps	6bps–25Mbps	6bps–12.5Mbps
QAM128	7bps–50Mbps	7bps–25Mbps	7bps–12.5Mbps
QAM256	8bps–50Mbps	8bps–25Mbps	8bps–12.5Mbps

Key Entry **Symbol Rate**

:BURSt:PN9

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:BURSt:PN9 NORMal|QUICk
[:SOURce]:RADio:PHS:BURSt:PN9?
```

This command controls the software PN9 generation.

NORMal This choice produces a maximum length PN9 sequence.

QUICk This choice produces a truncated PN9 sequence.

***RST** NORM

Key Entry **PN9 Mode Normal Quick**

Remarks Use Normal mode for bit-error-rate tests where a maximum length PN9 sequence is required.

:BURSt:SCRamble:SEED

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:BURSt:SCRamble:SEED <16-bit val>
[:SOURce]:RADio:PHS:BURSt:SCRamble:SEED?
```

This command select a 16-bit scramble seed value for scrambling.

***RST** #H3FF

Range #H0–#H3FF

Key Entry **Scramble Seed**

Remarks Although values may be set using this command, it does not active that scramble function.

To enable the scrambling function, refer to “:BURSt:SCRamble[:STATe]” on page 951.

:BURSt:SCRamble[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:BURSt:SCRamble[:STATe] ON|OFF|1|0
[:SOURce]:RADio:PHS:BURSt:SCRamble[:STATe]?
```

This command enables or disables the operating state of the scramble function.

ON (1) This choice scrambles data on the related fields, using the seed setting.

OFF (0) This choice disables the scramble function.

***RST** 0

Key Entry **Scramble Off On**

Remarks To set the seed setting, refer to “:BURSt:SCRamble:SEED” on page 951.

:BURSt:SHAPe:FALL:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:BURSt:SHAPe:FALL:DELay <val>
[:SOURce]:RADio:PHS:BURSt:SHAPe:FALL:DELay?
```

This command sets the burst shape fall delay.

The variable `<val>` is expressed in bits.

***RST** +0.00000000E+000

Range –22.1250 to 99

Key Entry **Fall Delay**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 969. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:FDELay" on page 953 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:FALL:TIME

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:BURSt:SHAPe:FALL:TIME <val>
[:SOURce]:RADio:PHS:BURSt:SHAPe:FALL:TIME?
```

This command sets the burst shape fall time.

The variable `<val>` is expressed in bits.

***RST** +4.00000000E+001

Range 0.1250–255.8750

Key Entry **Fall Time**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to “:MODulation[:TYPE]” on page 969. Refer to “:SRATe” on page 972 for a list of the minimum and maximum symbol rate values.

“:BURSt:SHAPe:FTIMe” on page 954 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User’s Guide*.

:BURSt:SHAPe:FDELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:BURSt:SHAPe:FDELay <val>
[:SOURce]:RADio:PHS:BURSt:SHAPe:FDELay?
```

This command sets the burst shape fall delay.

The variable `<val>` is expressed in bits.

***RST** +0.00000000E+000

Range –22.1250 to 99

Key Entry **Fall Delay**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to “:MODulation[:TYPE]” on page 969. Refer to “:SRATe” on page 972 for a list of the minimum and maximum symbol rate values.

“:BURSt:SHAPe:FALL:DELay” on page 952 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User’s Guide*.

:BURSt:SHAPe:FTIMe

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:BURSt:SHAPe:FTIMe <val>
[:SOURce]:RADio:PHS:BURSt:SHAPe:FTIMe?
```

This command sets the burst shape fall time.

The variable `<val>` is expressed in bits.

***RST** +4.00000000E+001

Range 0.1250–255.8750

Key Entry **Fall Time**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 969. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:FALL:TIME" on page 952 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:RDELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:BURSt:SHAPe:RDELay <val>
[:SOURce]:RADio:PHS:BURSt:SHAPe:RDELay?
```

This command sets the burst shape rise delay.

The variable `<val>` is expressed in bits.

***RST** +0.00000000E+000

Range –18.1250 to 99

Key Entry **Rise Delay**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 969. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:RISE:DELay" on page 955 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:RISE:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:BURSt:SHAPe:RISE:DELay <val>
[:SOURce]:RADio:PHS:BURSt:SHAPe:RISE:DELay?
```

This command sets the burst shape rise delay.

The variable `<val>` is expressed in bits.

***RST** +0.00000000E+000

Range –18.1250 to 99

Key Entry **Rise Delay**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 969. Refer to ":SRATe" on page 972 for minimum and maximum symbol rate values.

":BURSt:SHAPe:RDELay" on page 954 performs the same function; in compliance with the SCPI standard, both commands are listed.

See the *E4428C/38C ESG Signal Generators User's Guide* for concept information.

:BURSt:SHAPe:RISE:TIME

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:BURSt:SHAPe:RISE:TIME <val>
[:SOURce]:RADio:PHS:BURSt:SHAPe:RISE:TIME?
```

This command sets the burst shape rise time. The variable `<val>` is expressed in bits.

***RST** +4.00000000E+001

Range 0.1250–22.500

Key Entry **Rise Time**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 969. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values. The command ":BURSt:SHAPe:RTIMe" on page 956 performs the same function. See the *E4428C/38C ESG Signal Generators User's Guide* for more information.

:BURSt:SHAPe:RTIMe

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:BURSt:SHAPe:RTIMe <val>
[:SOURce]:RADio:PHS:BURSt:SHAPe:RTIMe?
```

This command sets the burst shape rise time. The variable `<val>` is expressed in bits.

***RST** +4.00000000E+001

Range 0.1250–22.500

Key Entry **Rise Time**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 969. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:RISE:TIME" on page 956 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal*

Generators User's Guide.

:BURSt:SHAPe[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:BURSt:SHAPe[:TYPE] SINE|"<file name>"
[:SOURce]:RADio:PHS:BURSt:SHAPe[:TYPE]?
```

This command specifies the burst shape as either `SINE` or a user-defined file (`"<file name>"`).

SINE This choice selects a state that is defined by the burst rise and fall *RST values, as the default burst shape type.

`"<file name>"` This choice selects a user designated file from signal generator memory (non-volatile).

***RST** SINE

Key Entry **Sine** **User File**

:BURSt[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:BURSt[:STATe] ON|OFF|1|0
[:SOURce]:RADio:PHS:BURSt[:STATe]?
```

This command enables or disables the burst function.

ON (1) This choice enables the transmission of framed data. If all timeslots which are switched on are up traffic channels or custom, you will be bursting the timeslots that are on; there will be no RF carrier during the off timeslots.

If you have switched on any timeslot that you have configured as a down traffic channel, the RF carrier is not switched off between any of the timeslots. The off timeslots are transmitted as a continuous series of ones for the time period of the off timeslots.

OFF (0) This choice enables the transmission of unframed data.

***RST** 0

Key Entry **Data Format Pattern Framed**

:CHANnel

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:CHANnel EVM|ACP
[:SOURce]:RADio:PHS:CHANnel?
```

This command optimizes the Nyquist and root Nyquist filters to minimize error vector magnitude (EVM) or to minimize adjacent channel power (ACP).

EVM This choice provides the most ideal passband.

ACP This choice improves stopband rejection.

***RST** EVM

Key Entry **Optimize FIR For EVM ACP**

Remarks To change the current filter type, refer to ":FILTer" on page 966.

:DATA

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:DATA PN9|PN11|PN15|PN20|PN23|FIX4|
"<file name>"|EXT|P4|P8|P16|P32|P64|PRAM
[:SOURce]:RADio:PHS:DATA?
```

This command sets the data pattern type (pseudo-random number sequence, 4-bit pattern, sequence of 1's and 0's, data from an external source, or a user file) for unframed data transmission.

***RST** PN23

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **Ext**

4 1's & 4 0's **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's**

64 1's & 64 0's **PRAM File**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:DATA:PRAM

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:DATA:PRAM "<file_name>"
[:SOURce]:RADio:PHS:DATA:PRAM?
```

This command selects a pattern RAM (PRAM) file as the pattern data type for the PHS (Personal Handy-phone System) format.

`"<file_name>"` This variable designates the PRAM file in WFM1. Refer to “File Name Variables” on page 13 for information on the file name syntax.

Key Entry **PRAM File**

Remarks Selecting this data source forces the burst source to `INTernal` to allow framing control.

The PRAM file must reside in the signal generator’s volatile memory (WFM1) in order to be accessed by this command. For more information on PRAM files, refer to “:DATA:PRAM:FILE:BLOCk” on page 112.

:DATA:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:DATA:FIX4 <val>
[:SOURce]:RADio:PHS:DATA:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern for unframed transmission according to the protocols (modulation type, symbol rate, filter, and burst shape) selected for the PHS format.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type.

:DEFault

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:DEFault
```

This command returns all of the PHS modulation format parameters to factory settings. It does not affect any other signal generator parameters.

Key Entry **Restore PHS Factory Default**

:DLINk:SLOT[1]|2|3|4:CUSTom

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:CUSTom PN9|PN11|PN15|
PN20|PN23|FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:CUSTom?
```

This command configures the data field for the selected downlink custom timeslot.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1’s & 4 0’s **8 1’s & 8 0’s** **16 1’s & 16 0’s** **32 1’s & 32 0’s**

64 1’s & 64 0’s

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:DLINk:SLOT[1]|2|3|4:CUSTom:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:CUSTom:FIX4 <val>
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:CUSTom:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected downlink custom timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type.

:DLINK:SLOT[1]|2|3|4:POWer

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:POWer MAIN|DELTa
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:POWer?
```

This command toggles the RF output power level function for the selected timeslot.

MAIN	This choice specifies RF output as the main power level.
DELTa	This choice specifies RF output as the alternative power level.
***RST**	MAIN
Key Entry	**Timeslot Ampl Main Delta**

:DLINk:SLOT[1]|2|3|4:SCHannel:CSID

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:SCHannel:CSID <bit_pattern>
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:SCHannel:CSID?
```

This command changes the 42-bit cell station identification code (CSID) field of the selected downlink timeslot. The preset hexadecimal value (when normal preset is selected) for CSID reflects the PHS protocol, however you can enter a new value with this command.

***RST**	#H20200020001
Range	#H0–#H3FFFFFFFFFF
Key Entry	**CSID**

:DLINk:SLOT[1]|2|3|4:SCHannel:IDLE

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:SCHannel:IDLE <bit_pattern>
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:SCHannel:IDLE?
```

This command changes the 34-bit idle (IDLE) field of the selected downlink timeslot. The preset hexadecimal value (when normal preset is selected) for IDLE reflects the PHS protocol, however you can enter a new value with this command.

***RST**	#H000000000
Range	#H0–#H3FFFFFFFF
Key Entry	**IDLE**

:DLINk:SLOT[1]|2|3|4:SCHannel:PSID

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:SCHannel:PSID <bit_pattern>
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:SCHannel:PSID?
```

This command changes the 28-bit personal station identification code (PSID) field in the synchronization channel of the selected downlink timeslot. The normal preset hexadecimal value for PSID reflects the PHS protocol, however you can enter a new value with this command.

***RST** #H0000001

Range #H0–#H3FFFFFFFF

Key Entry **PSID**

:DLINk:SLOT[1]|2|3|4:SCHannel:UWORd

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:SCHannel:UWORd <bit_pattern>
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:SCHannel:UWORd?
```

This command changes the unique word (UW) field of the selected downlink timeslot. The preset hexadecimal value (when normal preset is selected) for UW reflects the PHS protocol, however you can enter a new value with this command.

***RST** #H50EF2993

Range #H0–#HFFFFFFFF

Key Entry **UW**

:DLINk:SLOT[1]|2|3|4:STATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:STATe ON|OFF|1|0
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:STATe?
```

This command enables or disables the operating state of the selected downlink timeslot.

***RST** Timeslot 1: 1 *Timeslots 2–4*: 0

Key Entry **Timeslot Off On**

:DLINk:SLOT[1]|2|3|4:TCHannel:SACChannel

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:TCHannel:SACChannel
<bit_pattern>
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:TCHannel:SACChannel?
```

This command changes the 15-bit slow associated control channel of the selected downlink timeslot. The preset hexadecimal value (when normal preset is selected) for SACCH reflects the value specified by the standard.

***RST**	#H8000
Range	#H0–#HFFFF
Key Entry	**SA**

:DLINk:SLOT[1]|2|3|4:TCHannel:UWORd

Supported	E4438C with Option 402

```
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:TCHannel:UWORd <bit_pattern>
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:TCHannel:UWORd?
```

This command changes the unique word (UW) field of the selected downlink timeslot. The preset hexadecimal value (when normal preset is selected) for UW reflects the PHS protocol, however you can enter a new value with this command.

***RST**	#H3D4C
Range	#H0–#HFFFF
Key Entry	**UW**

:DLINk:SLOT[1]|2|3|4:TCHannel[:TCHannel]

Supported	E4438C with Option 402

```
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:TCHannel
[:TCHannel] PN9|PN11|PN15|PN20|PN23|FIX4|"<file name>"|EXT|P4|P8|P16|P32|
P64
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:TCHannel[:TCHannel]?
```

This command customizes the selected downlink traffic channel timeslot.

***RST**	PN9
Key Entry	**PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EX T**
	4 1's & 4 0's **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's**
	64 1's & 64 0's
Remarks	Refer to "File Name Variables" on page 13 for information on the file name syntax.

:DLINk:SLOT[1]|2|3|4:TCHannel[:TCHannel]:FIX4

Supported	E4438C with Option 402

```
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:TCHannel[:TCHannel]:FIX4 <val>
```

```
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4:TCHannel[:TCHannel]:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected downlink traffic channel timeslot.

***RST**	#B0000
Range	#B0000–#B1111 or 0–15
Key Entry	**FIX4**
Remarks	FIX4 must already be defined as the data type. To change the data type, refer to ":DLINk:SLOT[1]|2|3|4:TCHannel[:TCHannel]" on page 963.

:DLINk:SLOT[1]|2|3|4[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4[:TYPE] CUSTom|TCH|TCH_ALL|SYNC
[:SOURce]:RADio:PHS:DLINk:SLOT[1]|2|3|4[:TYPE]?
```

This command sets the downlink timeslot type for the selected timeslot.

***RST**	Timeslot 1: TCH	Timeslots 2–4: CUST		
Key Entry	**Custom**	**TCH**	**TCH All**	**SYNC**

:EDATa:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:EDATa:DELay?
```

This query returns the amount of delay (in symbols) from the external data input to the beginning of the symbol on the I OUT and Q OUT rear panel connectors and the front panel RF OUTPUT connector.

Remarks When the format is turned off, the delay value is unchanged; the query will return the same delay value if the format is on or off.

:EDCLock

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:EDCLock SYMBol|NORMal
[:SOURce]:RADio:PHS:EDCLock?
```

This command sets the external data clock use.

SYMBol This choice specifies that a continuous symbol clock signal must be provided to

	the SYMBOL SYNC input connector.
NORMal	This choice specifies that the DATA CLOCK input connector requires a bit clock. The SYMBOL SYNC input connector requires a (one-shot or continuous) symbol sync signal.
***RST**	NORM
Key Entry	**Ext Data Clock Normal Symbol**
Remarks	Both choices have no effect in internal clock mode. Refer to ":BBCLock" on page 948 to select EXT as the data clock type.

:EREFerence

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:EREFerence INT|EXT
[:SOURce]:RADio:PHS:EREFerence?
```

This command selects either an internal or external bit-clock reference for the data generator.

***RST**	INT
Key Entry	**BBG Ref Ext Int**
Remarks	If the EXT choice is selected, the external source's frequency value must be applied to the BASEBAND GEN REF IN rear panel connector. The external reference and external data clock are not applicable at the same time. If both are selected, then the external reference takes precedence. Refer to, ":EREFerence:VALue" on page 965 to enter the external reference frequency setting.

:EREFerence:VALue

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:EREFerence:VALue <val>
[:SOURce]:RADio:PHS:EREFerence:VALue?
```

This command sets the expected bit-clock reference frequency value for an externally applied reference signal.

The variable `<val>` is expressed in units of hertz (Hz–MHz).

***RST**	+1.30000000E+007
Range	2.5E5–1E8

Key Entry **Ext BBG Ref Freq**

Remarks The value specified by this command is effective only when you are using an external reference applied to the BASEBAND GEN REF IN rear panel connector.

Refer to ":EREFerence" on page 965 to select EXT (external source) as the reference for the bit-clock.

:FILTer

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:FILTer RNYQuist|NYQuist|GAUSsian|RECTangle|
IS95|IS95_EQ|IS95_MOD|IS95_MOD_EQ|AC4Fm|UGGaussian|"<user FIR>"
[:SOURce]:RADio:PHS:FILTer?
```

This command selects the pre-modulation filter type.

IS95 This choice selects a filter that meets the criteria of the IS-95 standard.

IS95_EQ This choice selects a filter which is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard. This filter is only used for IS-95 baseband filtering.

IS95_MOD This choice selects a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.

IS95_MOD_EQ This choice selects a filter which is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance), with lower passband rejection.

AC4Fm This choice selects a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.

UGGaussian This choice selects a backwards compatible GSM Gaussian filter (Gaussian filter with a fixed BbT value of 0.300) for the ESG E44xxB Option UN3 or UN4.

"<user FIR>" This variable is any filter file that you have stored into memory.

***RST** RNYQ

Key Entry **Root Nyquist** **Nyquist** **Gaussian** **Rectangle** **IS-95** **IS-95 w/EQ** **IS-95 Mod** **IS-95 Mod w/EQ** **APCO 25 C4FM** **UN3/4 GSM Gaussian** **User FIR**

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:IQ:SCALe

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:IQ:SCALe <val>
[:SOURce]:RADio:PHS:IQ:SCALe?
```

This command sets the amplitude of the I/Q outputs for better adjacent channel power (ACP); lower scaling values equate to better ACP.

The variable `<val>` is expressed in units of percent.

***RST** +100

Range 1–200

Key Entry **I/Q Scaling**

Remarks This command has no effect with MSK or FSK modulation.

:MODulation:FSK[:DEViation]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:MODulation:FSK[:DEViation] <val>
[:SOURce]:RADio:PHS:MODulation:FSK[:DEViation]?
```

This command sets the symmetric FSK frequency deviation value.

The variable `<val>` is expressed in units of Hertz and the maximum range value equals the current symbol rate value multiplied by four, limited to 20 MHz.

***RST** +4.00000000E+002

Range 0–2E7

Key Entry **Freq Dev**

Remarks To change the modulation type, refer to ":MODulation[:TYPE]" on page 969.

Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

To set an asymmetric FSK deviation value, refer to the *E4428C/38C ESG Signal Generators User's Guide* for more information.

:MODulation:MSK[:PHASe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:MODulation:MSK[:PHASe] <val>
[:SOURce]:RADio:PHS:MODulation:MSK[:PHASe]?
```

This command sets the MSK phase deviation value. The variable `<val>` is in units of degrees.

***RST** +9.00000000E+001

Range 0–100

Key Entry **Phase Dev**

:MODulation:UFSK

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:MODulation:UFSK "<file name>"
[:SOURce]:RADio:PHS:MODulation:UFSK?
```

This command selects a user-defined FSK file from the signal generator memory.

Key Entry **User FSK**

Remarks The user-defined FSK file is held in signal generator memory until the command that selects user FSK as the modulation type is sent. Refer to ":MODulation[:TYPE]" on page 969 to change the current modulation type.

Refer to "File Name Variables" on page 13 for information on the file name syntax.

:MODulation:UIQ

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:MODulation:UIQ "<file name>"
[:SOURce]:RADio:PHS:MODulation:UIQ?
```

This command selects a user-defined I/Q file from the signal generator memory.

Key Entry **User I/Q**

Remarks The user-defined I/Q file is held in signal generator memory until the command that selects user I/Q as the modulation type is sent. Refer to ":MODulation[:TYPE]" on page 969 to change the current modulation type.

Refer to "File Name Variables" on page 13 for information on the file name syntax.

:MODulation[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:MODulation[:TYPE] BPSK|QPSK|IS95QPSK|
GRAYQPSK|OQPSK|IS95OQPSK|P4DQPSK|PSK8|PSK16|D8PSK|MSK|FSK2|FSK4|
FSK8|FSK16|C4FM|QAM4|QAM16|QAM32|QAM64|QAM128|QAM256|UIQ|UFSK
[:SOURce]:RADio:PHS:MODulation[:TYPE]?
```

This command sets the modulation type for the PHS personality.

***RST** P4DQPSK

Key Entry **BPSK** **QPSK** **IS-95 QPSK** **Gray Coded QPSK** **OQPSK**

IS-95 OQPSK **π/4 DQPSK** **8PSK** **16PSK** **D8PSK** **MSK** **2-Lvl FSK**

4-Lvl FSK **8-Lvl FSK** **16-Lvl FSK** **C4FM** **4QAM** **16QAM** **32QAM**

64QAM **128QAM** **256QAM** **User I/Q** **User FSK**

:POLarity[:ALL]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:POLarity[:ALL] NORMal|INVerted
[:SOURce]:RADio:PHS:POLarity[:ALL]?
```

This command sets the rotation direction of the phase modulation vector.

NORMal This choice selects normal phase polarity.

INVerted This choice inverts the internal Q signal.

***RST** NORM

Key Entry **Phase Polarity Normal Invert**

:SECondary:RECall

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:SECondary:RECall
```

This command recalls the secondary frame configuration, overwriting the current state.

Key Entry **Recall Secondary Frame State**

Remarks To save a secondary frame state, refer to ":SECondary:SAVE" on page 970.

A secondary frame is not active until the secondary state is enabled. To activate a secondary frame, refer to ":SECondary[:STATe]" on page 970.

:SECondary:SAVE

Supported E4438C with Option 402

`[:SOURce]:RADio:PHS:SECondary:SAVE`

This command saves the current frame configuration as the secondary frame with the filename `PHS_SECONDARY_FRAME`.

Key Entry **Save Secondary Frame State**

Remarks To recall the secondary frame (saved in non-volatile signal generator memory), refer to ":SECondary:RECall" on page 969.

:SECondary:TRIGger[:SOURce]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:SECondary:TRIGger[:SOURce] KEY|EXT|BUS
[:SOURce]:RADio:PHS:SECondary:TRIGger[:SOURce]?
```

This command selects the type of triggering for the secondary frame.

KEY This choice enables triggering by pressing the front panel **Trigger** hardkey.

EXT This choice enables triggering using an externally applied signal at the PATT TRIG IN rear panel connector or the PATT TRIG IN 2 pin on the rear panel AUX I/O connector. To select the appropriate connector, refer to ":TRIGger[:SOURce]:EXTernal[:SOURce]" on page 976.

BUS This choice enables GPIB triggering using the `*TRG` or `GET` command or LAN and RS-232 triggering using the `*TRG` command.

Key Entry **Trigger Key** **Ext** **Bus**

:SECondary[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:SECondary[:STATe] ON|OFF|1|0
[:SOURce]:RADio:PHS:SECondary[:STATe]?
```

This command enables or disables the ability to switch to the secondary frame.

***RST** 0

Key Entry **Secondary Frame Off On**

Remarks A frame must already be saved as the secondary frame in order to turn the secondary state function on.

To save a frame as the secondary frame, refer to ":SECondary:SAVE" on page 970.

:SOUT

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:SOUT FRAME|SLOT|ALL
[:SOURce]:RADio:PHS:SOUT?
```

This command sets the synchronization location (within the pattern of data) and the type of output at the EVENT 1 rear panel connector.

FRAME This choice outputs a 1-bit signal, synchronized to the bit selected by the synchronization output offset command, for a framed data pattern.

SLOT This choice outputs a 1-bit signal, synchronized to the bit selected by the synchronization output offset command, for a selected timeslot.

ALL This choice outputs a 1-bit signal, synchronized to the bit selected by the synchronization output offset command, for all active timeslots.

***RST** FRAME

Choices FRAME SLOT ALL

:SOUT:OFFSet

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:SOUT:OFFSet <val>
[:SOURce]:RADio:PHS:SOUT:OFFSet?
```

This command sets the offset value for the location of the output synchronization signal on the EVENT1 rear panel connector relative to the beginning of the framed data pattern or timeslot.

The variable `<val>` is expressed as a number of bits.

***RST** +0

Range –239 to 239

Key Entry **Sync Out Offset**

Remarks Negative values move the synchronization output signal earlier; positive values move it later.

To change the output of the EVENT1 rear panel connector to SLOT, refer to ":SOUT" on page 971.

:SOUT:SLOT

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:SOUT:SLOT <val>
[:SOURce]:RADio:PHS:SOUT:SLOT?
```

This command selects the timeslot that will trigger a 1-bit output signal at the EVENT 1 rear panel connector.

***RST** +0

Range 1–4

Key Entry **Begin Timeslot #**

Remarks To change the output of the EVENT1 rear panel connector to SLOT, refer to ":SOUT" on page 971.

:SRATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:SRATe <val>
[:SOURce]:RADio:PHS:SRATe?
```

This command sets the transmission symbol rate. Symbol rate is the bit rate divided by the bits per symbol. A change in the symbol rate affects the bit rate. Refer to ":BRATe" on page 881 for information on bit rate.

The variable `<val>` is expressed in units of symbols per second (sps–Msps) and the maximum symbol rate depends on the filter. Refer to ":FILTer" on page 966 for minimum filter symbol width.

The filter may have to be truncated down to 32 or 16 symbols wide to achieve the highest symbol rate. The signal generator's internal filters are not truncated below their minimum filter length and user-defined FIR filters are not truncated. If the filter cannot be truncated then the symbol rate is limited to the maximum rate of the narrowest filter size possible.

The relative timing of the modulated data, as well as the actual filter response is affected when the filter is truncated.

When the symbol rate changes, the ESG reconfigures the baseband generator. The time required to reconfigure the baseband generator is inversely proportional to the symbol rate: lower symbol rates require more time.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 969.

***RST** +1.92000000E+004

Range

Modulation Type	Symbol Rate Range		
	16 Symbol Wide Filter	*32 Symbol Wide Filter*	*64 Symbol Wide Filter*
BPSK, FSK2, MSK	1sps–50Msps	1sps–25Msps	1sps–12.5Msps
C4FM, OQPSK, FSK4 OQPSKI95, QPSK P4QPPSK, QPSKIS95 GRAYQPSK, QAM4	2sps–25Msps	2sps–12.5Msps	2sps–6.25Msps
D8PSK, EDGE, FSK8, PSK8	3sps–16.666666666 Msps	3sps–8.333333333 Msps	3sps–4.166666666Msps
FSK16, PSK16, QAM16	4sps–12.5Msps	4sps–6.25Msps	4sps–3.125Msps
QAM32	5sps–10Msps	5sps–5Msps	5sps–2.5Msps
QAM64	6sps–8.333333333 Msps	6sps–4.166666666 Msps	6sps–2.083333333 Msps
QAM128	7sps–7.142857142 Msps	7sps–3.571428572 Msps	7sps–1.785714285 Msps
QAM256	8sps–6.25Msps	8sps–3.125 Msps	8sps–1.5625 Msps

NOTE Using I/Q skew will half the minimum number of symbols for the selected filter.

Key Entry **Symbol Rate**

:TRIGger:TYPE

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:TRIGger:TYPE CONTinuous|SINGle|GATE
[:SOURce]:RADio:PHS:TRIGger:TYPE?
```

This command sets the trigger type.

CONTinuous The framed data sequence repeats continuously; the sequence restarts every time the previous playback is completed. To customize continuous triggering, refer to ":TRIGger:TYPE:CONTinuous[:TYPE]" on page 974.

SINGle The framed data sequence plays once for every trigger received.

GATE	An external trigger signal interrupts the playback while the gating signal is in the inactive state. Playback resumes when the external control signal returns to the active state. The active state can be set to high or low.
***RST**	CONT
Key Entry	**Continuous** **Single** **Gated**

:TRIGger:TYPE:CONTinuous[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:TRIGger:TYPE:CONTinuous[:TYPE] FREE|TRIGger|RESet
[:SOURce]:RADio:PHS:TRIGger:TYPE:CONTinuous[:TYPE]?
```

This commands selects the waveform's response to a trigger signal while using the continuous trigger mode.

For more information on triggering and to select the continuous trigger mode, see ":TRIGger:TYPE" on page 973.

The following list describes the waveform's response to each of the command choices:

FREE	Turning the ARB format on immediately triggers the waveform. The waveform repeats until you turn the format off, select another trigger, or choose another waveform file.
TRIGger	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously until you turn the format off, select another trigger, or choose another waveform file.
RESet	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously. Subsequent triggers reset the waveform to the beginning. For a waveform sequence, this means to the beginning of the first segment in the sequence.
***RST**	FREE
Key Entry	**Free Run** **Trigger & Run** **Reset & Run**

:TRIGger:TYPE:GATE:ACTive

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:TRIGger:TYPE:GATE:ACTive LOW|HIGH
[:SOURce]:RADio:PHS:TRIGger:TYPE:GATE:ACTive?
```

This command selects the active state (gate polarity) of the gate while using the gating trigger mode.

The LOW and HIGH selections correspond to the low and high states of an external trigger signal. For example, when you select HIGH, the active state occurs during the high of the trigger signal. When the active state occurs, the ESG stops the waveform playback at the last played sample point, then restarts the playback at the next sample point when the inactive state occurs. For more information on triggering and to select gating as the trigger mode, see ":TRIGger:TYPE" on page 973.

The following list describes the ESG's gating behavior for the polarity selections:

LOW The waveform playback stops when the trigger signal goes low (active state) and restarts when the trigger signal goes high (inactive state).

HIGH The waveform playback stops when the trigger signal goes high (active state) and restarts when the trigger signal goes low (inactive state).

***RST** HIGH

Key Entry **Gate Active Low High**

:TRIGger[:SOURce]:EXTernal:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:TRIGger[:SOURce]:EXTernal:DELay <val>
[:SOURce]:RADio:PHS:TRIGger[:SOURce]:EXTernal:DELay?
```

This command sets the number of bits to delay the ESG's response to an external trigger.

The bit delay is a delay between when the ESG receives the trigger and when it responds to the trigger. The delay uses the clocks of the bit-clock to time the delay. After the ESG receives the trigger and the set number of delay bits (clocks) occurs, the ESG transmits the data pattern.

The delay occurs after you enable the state. See ":TRIGger[:SOURce]:EXTernal:DELay:STATe" on page 976. You can set the number of bits either before or after enabling the state.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 977.

***RST** +0

Range 0–1048575

Key Entry **Ext Delay Bits**

:TRIGger[:SOURce]:EXTernal:DELay:STATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:TRIGger[:SOURce]:EXTernal:DELay:STATe ON|OFF|1|0
[:SOURce]:RADio:PHS:TRIGger[:SOURce]:EXTernal:DELay:STATe?
```

This command enables or disables the operating state of the external trigger delay function.

For setting the delay time, see ":TRIGger[:SOURce]:EXTernal:DELay" on page 975, and for more information on configuring an external source, see":TRIGger[:SOURce]" on page 977.

***RST** 0

Key Entry **Ext Delay Off On**

:TRIGger[:SOURce]:EXTernal:SLOPe

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:TRIGger[:SOURce]:EXTernal:SLOPe POSitive|NEGative
[:SOURce]:RADio:PHS:TRIGger[:SOURce]:EXTernal:SLOPe?
```

This command sets the polarity for an external trigger signal while using the continuous, single triggering mode. To set the polarity for gating, see ":TRIGger:TYPE:GATE:ACTive" on page 975.

The POSitive and NEGative selections correspond to the high (positive) and low (negative) states of the external trigger signal. For example, when you select POSitive, the waveform responds (plays) during the high state of the trigger signal. When the ESG receives multiple trigger occurrences when only one is required, the signal generator uses the first trigger and ignores the rest.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 977.

***RST** NEG

Key Entry **Ext Polarity Neg Pos**

:TRIGger[:SOURce]:EXTernal[:SOURce]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:TRIGger[:SOURce]:EXTernal[:SOURce] EPT1|
EPT2|EPTRIGGER1|EPTRIGGER2
[:SOURce]:RADio:PHS:TRIGger[:SOURce]:EXTernal[:SOURce]?
```

This command selects which PATTERN TRIG IN connection the ESG uses to accept an externally applied trigger signal when external is the trigger source selection.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 977. For more information on the rear-panel connectors, see the *E4428C/38C ESG Signal Generators User's Guide*.

The following list describes the command choices:

EPT1	This choice is synonymous with EPTRIGGER1 and selects the PATTERN TRIG IN rear-panel connector.
EPT2	This choice is synonymous with EPTRIGGER2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.
EPTRIGGER1	This choice is synonymous with EPT1 and selects the PATTERN TRIG IN rear-panel connector.
EPTRIGGER2	This choice is synonymous with EPT2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.

***RST** EPT1

Key Entry **Patt Trig In 1** **Patt Trig In 2**

:TRIGger[:SOURce]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:TRIGger[:SOURce] KEY|EXT|BUS
[:SOURce]:RADio:PHS:TRIGger[:SOURce]?
```

This command sets the trigger source.

For more information on triggering, see ":TRIGger:TYPE" on page 973. The following list describes the command choices:

KEY — This choice enables manual triggering by pressing the front-panel **Trigger** hardkey.

EXT — An externally applied signal triggers the waveform. This is the only choice that works with gating. The following conditions affect an external trigger:

- The input connector selected for the trigger signal. You have a choice between the rear-panel PATTERN TRIG IN connector or the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector. To make the connector selection, see ":TRIGger[:SOURce]:EXTernal[:SOURce]" on page 976.

  For more information on the connectors and on connecting the cables, see the *E4428C/38C ESG Signal Generators User's Guide*.

- The trigger signal polarity:
  - — gating mode, see “:TRIGger:TYPE:GATE:ACTive” on page 975
  - — continuous and single modes, see “:TRIGger[:SOURce]:EXTernal[:SOURce]” on page 976
- The time delay between when the ESG receives a trigger and when the waveform responds to the trigger. There are two parts to setting the delay:
  - — setting the amount of delay, see “:TRIGger[:SOURce]:EXTernal:DELay” on page 975
  - — turning the delay on, see “:TRIGger[:SOURce]:EXTernal:DELay:STATe” on page 976

BUS This choice enables triggering over the GPIB or LAN using the `*TRG` or `GET` commands or the AUXILIARY INTERFACE (RS-232) using the `*TRG` command.

***RST** KEY

Key Entry **Trigger Key** **Ext** **Bus**

:ULINk:SLOT[1]|2|3|4:CUSTom

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:CUSTom PN9|PN11|PN15|
PN20|PN23|FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:CUSTom?
```

This command configures the data field for the selected uplink custom timeslot.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1’s & 4 0’s **8 1’s & 8 0’s** **16 1’s & 16 0’s** **32 1’s & 32 0’s**

64 1’s & 64 0’s

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:ULINk:SLOT[1]|2|3|4:CUSTom:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:CUSTom:FIX4 <val>
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:CUSTom:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected uplink custom timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type.

:ULINK:SLOT[1]|2|3|4:POWer

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:POWer MAIN|DELTa
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:POWer?
```

This command toggles the RF output power level function for the selected timeslot.

MAIN This choice specifies RF output as the main power level.

DELTa This choice specifies RF output as the alternative power level.

***RST** MAIN

Key Entry **Timeslot Ampl Main Delta**

:ULINk:SLOT[1]|2|3|4:SCHannel:CSID

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:SCHannel:CSID <bit_pattern>
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:SCHannel:CSID?
```

This command changes the 42-bit cell station identification code (CSID) field of the selected uplink timeslot. The preset hexadecimal value (when normal preset is selected) for CSID reflects the PHS protocol, however you can enter a new value with this command.

***RST** #H20200020001

Range #H0–#H3FFFFFFFFFF

Key Entry **CSID**

:ULINk:SLOT[1]|2|3|4:SCHannel:IDLE

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:SCHannel:IDLE <bit_pattern>
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:SCHannel:IDLE?
```

This command changes the 34-bit idle (IDLE) field of the selected uplink timeslot. The preset hexadecimal value (when normal preset is selected) for IDLE reflects the PHS protocol, however you can enter a new value with this command.

***RST** #H000000000

Range #H0–#H3FFFFFFFF

Key Entry **IDLE**

:ULINk:SLOT[1]|2|3|4:SCHannel:PSID

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:SCHannel:PSID <bit_pattern>
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:SCHannel:PSID?
```

This command changes the 28-bit personal station identification code (PSID) field in the synchronization channel of the selected uplink timeslot. The preset (normal) hexadecimal value for PSID reflects the PHS protocol, however you can enter a new value with this command.

***RST** #H0000001

Range #H0–#H3FFFFFFFF

Key Entry **PSID**

:ULINk:SLOT[1]|2|3|4:SCHannel:UWORd

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:SCHannel:UWORd <bit_pattern>
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:SCHannel:UWORd?
```

This command changes the unique word (UW) field of the selected uplink timeslot. The preset hexadecimal value (when normal preset is selected) for UW reflects the PHS protocol, however you can enter a new value with this command.

***RST** #H050EF2993

Range #H0–#H0FFFFFFFF

Key Entry **UW**

:ULINk:SLOT[1]|2|3|4:STATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:STATe ON|OFF|1|0
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:STATe?
```

This command enables or disables the operating state of the selected uplink timeslot.

***RST** Timeslot 1: 1 Timeslots 2–4: 0

Key Entry **Timeslot Off On**

:ULINk:SLOT[1]|2|3|4:TCHannel:SACChannel

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:TCHannel:SACChannel
<bit_pattern>
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:TCHannel:SACChannel?
```

This command changes the 15-bit slow associated control channel of the selected uplink timeslot. The preset hexadecimal value (when normal preset is selected) for SACCH reflects the value specified by the standard.

***RST** #H8000

Range #H0–#HFFFF

Key Entry **SA**

:ULINk:SLOT[1]|2|3|4:TCHannel:UWORd

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:TCHannel:UWORd <bit_pattern>
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:TCHannel:UWORd?
```

This command changes the unique word (UW) field of the selected uplink timeslot. The preset hexadecimal value (when normal preset is selected) for UW reflects the PHS protocol, however you can enter a new value with this command.

***RST** #H3D4C

Range #H0–#HFFFF

Key Entry **UW**

:ULINk:SLOT[1]|2|3|4:TCHannel[:TCHannel]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:TCHannel
[:TCHannel] PN9|PN11|PN15|PN20|PN23|FIX4|"<file name>"|EXT|P4|P8|P16|P32|
P64
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:TCHannel[:TCHannel]?
```

This command selects the data pattern for the selected uplink traffic channel timeslot.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1's & 4 0's **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's**

64 1's & 64 0's

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:ULINk:SLOT[1]|2|3|4:TCHannel[:TCHannel:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:TCHannel[:TCHannel]:FIX4 <val>
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4:TCHannel[:TCHannel]:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected uplink traffic channel timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type.

:ULINk:SLOT[1]|2|3|4[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4[:TYPE] CUSTom|TCH|TCH_ALL|SYNC
[:SOURce]:RADio:PHS:ULINk:SLOT[1]|2|3|4[:TYPE]?
```

This command sets the uplink timeslot type for the selected uplink timeslot.

***RST** Timeslot 1: TCH Timeslots 2–4: CUST

Key Entry **Timeslot Type**

[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:PHS[:STATe] ON|OFF|1|0
[:SOURce]:RADio:PHS[:STATe]?
```

This command enables or disables the PHS modulation format.

***RST** 0

Key Entry **PHS Off On**

Remarks Although the PHS modulation is enabled with this command, the RF carrier is not modulated unless you also activate the front panel **Mod On/Off** hardkey.

TETRA Subsystem–Option 402 ([:SOURce]:RADio:TETRa)

:ALPha

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:ALPHa <val>
[:SOURce]:RADio:TETRa:ALPHa?
```

This command changes the Nyquist or root Nyquist filter's alpha value.

The filter alpha value can be set to a minimum level (0), a maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +3.50000000E–001

Range 0.000–1.000

Key Entry **Filter Alpha**

Remarks To change the current filter type, refer to ":FILTer" on page 998.

:BBCLock

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:BBCLock INT[1]|EXT[1]
[:SOURce]:RADio:TETRa:BBCLock?
```

This command toggles the data (bit) clock input to the baseband generator board to either internal or external. This command is independent in each mode and works for both non-burst (continuous) and burst modes. This allows for a matrix of selections between burst/non-burst, internal/external data generation, internal/external data clock, and external bit/symbol data clock.

INT[1] This choice selects the signal generator internal data clock.

EXT[1] This choice selects an external data clock input.

***RST** INT

Key Entry **BBG Data Clock Ext Int**

Remarks A data clock or continuous symbol sync input must be supplied when external mode is used.

:BBT

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:BBT <val>
[:SOURce]:RADio:TETRa:BBT?
```

This command changes the bandwidth-multiplied-by-bit-time (BbT) filter parameter.

The filter BbT value can be set to the maximum level (1) or in between the minimum level (0.100) and maximum level by using fractional numeric values (0.101–0.999).

***RST** +5.00000000E–001

Range 0.100–1.000

Key Entry Filter BbT

Remarks This command is effective only after choosing a Gaussian filter. It does not have an effect on other types of filters.

To change the current filter type, refer to ":FILTer" on page 998.

:BRATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:BRATe <val>
[:SOURce]:RADio:TETRa:BRATe?
```

This command sets the bit rate in bits per second (bps–Mbps). The maximum bit rate is dependent on the modulation type and filter as shown in the following tables

The IQ digital data stream is shaped by a FIR filter. The filter length and associated latency and frequency response are dependent on the bit rate as shown in the following tables. The signal generator selects a filter length.

For higher bit rates, the FIR filter length may be truncated (if the minimum filter size allows it) which will impact the relative timing of the modulated data, as well as the actual filter response (see the symbol rate command ":SRATe" on page 972). Refer to ":FILTer" on page 998 for information on filter symbol widths. To change the modulation type, refer to ":MODulation[:TYPE]" on page 1001.

When the bit rate is changed, the ESG reconfigures the baseband generator. The time required to reconfigure the baseband generator is inversely proportional to the bit rate: lower bit rates require more time.

***RST** +3.60000000E+004

Range

Modulation Type	Bit Rate Range		
	16 Symbol Wide Filter	*32 Symbol Wide Filter*	*64 Symbol Wide Filter*
BPSK, FSK2, MSK	1bps–50Mbps	1bps–25Mbps	1bps–12.5Mbps
C4FM, OQPSK, FSK4	2bps–50Mbps	2bps–25Mbps	2bps–12.5Mbps
OQPSKI95, QPSK			
P4QPPSK, QPSKIS95			
GRAYQPSK, QAM4			
D8PSK, EDGE, FSK8, PSK8	3bps–50Mbps	3bps–25Mbps	3bps–12.5Mbps
FSK16, PSK16, QAM16	4bps–50Mbps	4bps–25Mbps	4bps–12.5Mbps
QAM32	5bps–50Mbps	5bps–25Mbps	5bps–12.5Mbps
QAM64	6bps–50Mbps	6bps–25Mbps	6bps–12.5Mbps
QAM128	7bps–50Mbps	7bps–25Mbps	7bps–12.5Mbps
QAM256	8bps–50Mbps	8bps–25Mbps	8bps–12.5Mbps

Key Entry **Symbol Rate**

:BURSt:PN9

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:BURSt:PN9 NORMal|QUICk
[:SOURce]:RADio:TETRa:BURSt:PN9?
```

This command controls the software PN9 generation.

NORMal This choice produces a maximum length PN9 sequence.

QUICk This choice produces a truncated PN9 sequence.

***RST** NORM

Key Entry **PN9 Mode Normal Quick**

Remarks Use Normal mode for bit-error-rate tests where a maximum length PN9 sequence is required.

:BURSt:SCRamble:SEED

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:BURSt:SCRamble:SEED <32-bit val>
[:SOURce]:RADio:TETRa:BURSt:SCRamble:SEED?
```

This command sets the 32-bit scramble seed value.

***RST** #HFFFFFFFF

Range #H0–#HFFFFFFFF

Key Entry **Scramble Seed**

Remarks Although values may be set using this command, it does not active that scramble function.

Refer to ":BURSt:SCRamble[:STATe]" on page 987 to enable the scrambling function.

:BURSt:SCRamble[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:BURSt:SCRamble[:STATe] ON|OFF|1|0
[:SOURce]:RADio:TETRa:BURSt:SCRamble[:STATe]?
```

This command enables or disables the scramble function.

ON (1) This choice scrambles data on the related fields, using the seed setting.

OFF (0) This choice disables the scramble function.

***RST** 0

Key Entry **Scramble Off On**

Remarks To set the seed value, refer to ":BURSt:SCRamble:SEED" on page 987.

:BURSt:SHAPe:FALL:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:BURSt:SHAPe:FALL:DELay <val>
[:SOURce]:RADio:TETRa:BURSt:SHAPe:FALL:DELay?
```

This command sets the burst shape fall delay.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +0.00000000E+000

Range –22.3750 to 99

Key Entry **Fall Delay**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 1001. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:FDELay" on page 989 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:FALL:TIME

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:BURSt:SHAPe:FALL:TIME <val>
[:SOURce]:RADio:TETRa:BURSt:SHAPe:FALL:TIME?
```

This command sets the burst shape fall time.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +8.00000000E+000

Range 0.1250–50

Key Entry **Fall Time**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 1001. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:FTIMe" on page 989 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:FDELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:BURSt:SHAPe:FDELay <val>
[:SOURce]:RADio:TETRa:BURSt:SHAPe:FDELay?
```

This command sets the burst shape fall delay.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +0.00000000E+000

Range –22.3750 to 99

Key Entry **Fall Delay**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 1001. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:FALL:DELay" on page 987 performs the same

function; in compliance withe the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:FTIMe

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:BURSt:SHAPe:FTIMe <val>
[:SOURce]:RADio:TETRa:BURSt:SHAPe:FTIMe?
```

This command sets the burst shape fall time.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +8.00000000E+000

Range 0.1250–50

Key Entry **Fall Time**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 1001. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:FALL:TIME" on page 988 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

:BURSt:SHAPe:RDELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:BURSt:SHAPe:RDELay <val>
[:SOURce]:RADio:TETRa:BURSt:SHAPe:RDELay?
```

This command sets the burst shape rise delay. The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +0.00000000E+000

Range –14.3750 to 99

Key Entry **Rise Delay**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 1001. Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

":BURSt:SHAPe:RISE:DELay" on page 991 performs the same function; in compliance with the SCPI standard, both commands are listed.

See the *E4428C/38C ESG Signal Generators User's Guide* for concept information.

:BURSt:SHAPe:RISE:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:BURSt:SHAPe:RISE:DELay <val>
[:SOURce]:RADio:TETRa:BURSt:SHAPe:RISE:DELay?
```

This command sets the burst shape rise delay.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +0.00000000E+000

Range –14.3750 to 99

Key Entry **Rise Delay**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to “:MODulation[:TYPE]” on page 1001. Refer to “:SRATe” on page 972 for a list of the minimum and maximum symbol rate values.

“:BURSt:SHAPe:RDELay” on page 990 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User’s Guide*.

:BURSt:SHAPe:RISE:TIME

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:BURSt:SHAPe:RISE:TIME <val>
[:SOURce]:RADio:TETRa:BURSt:SHAPe:RISE:TIME?
```

This command sets the burst shape rise time.

The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +8.00000000E+000

Range 0.1250–22.5000

Key Entry **Rise Time**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to “:MODulation[:TYPE]” on page 1001. Refer to “:SRATe” on page 972 for a list of the minimum and maximum symbol rate values.

“:BURSt:SHAPe:RTIMe” on page 992 performs the same function; in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User’s Guide*.

:BURSt:SHAPe:RTIMe

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:BURSt:SHAPe:RTIMe <val>
[:SOURce]:RADio:TETRa:BURSt:SHAPe:RTIMe?
```

This command sets the burst shape rise time. The variable `<val>` is expressed in bits. The minimum and maximum values depend upon modulation type and symbol rate.

***RST** +8.00000000E+000

Range 0.1250–22.5000

Key Entry **Rise Time**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or `*RST`.

To change the modulation type, refer to “:MODulation[:TYPE]” on page 1001. Refer to “:SRATe” on page 972 for a list of the minimum and maximum symbol rate values.

“:BURSt:SHAPe:RISE:TIME” on page 991 performs the same function;

in compliance with the SCPI standard, both commands are listed.

For concept information on burst shaping, refer to the *E4428C/38C ESG Signal Generators User’s Guide*.

:BURSt:SHAPe[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:BURSt:SHAPe[:TYPE] SINE|"<file name>"
[:SOURce]:RADio:TETRa:BURSt:SHAPe[:TYPE]?
```

This command specifies the burst shape as either `SINE` or a user-defined file (`"<file name>"`).

SINE	This choice selects a state that is defined by the burst rise and fall `*RST` values as the default burst shape type.
`"<file name>"`	This choice selects a user designated file from signal generator memory (non-volatile).
***RST**	SINE
Key Entry	**Sine** **User File**

:BURSt[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:BURSt[:STATe] ON|OFF|1|0
[:SOURce]:RADio:TETRa:BURSt[:STATe]?
```

This command enables or disables the burst function.

ON (1)	This choice enables the transmission of framed data. If all timeslots which are switched on are up traffic channels or custom, you will be bursting the timeslots that are on; there will be no RF carrier during the off timeslots. If you have switched on any timeslot that you have configured as a down traffic channel, the RF carrier is not switched off between any of the timeslots. The off timeslots are transmitted as a continuous series of ones for the time period of the off timeslots.
OFF (0)	This choice enables the transmission of unframed data.
***RST**	0
Key Entry	**Data Format Pattern Framed**

:CHANnel

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:CHANnel EVM|ACP
[:SOURce]:RADio:TETRa:CHANnel?
```

This command optimizes the Nyquist and root Nyquist filters to minimize error vector magnitude (EVM) or to minimize adjacent channel power (ACP).

EVM This choice provides the most ideal passband.

ACP This choice improves stopband rejection.

***RST** EVM

Key Entry **Optimize FIR For EVM ACP**

Remarks To change the current filter type, refer to “:FILTer” on page 998.

:DATA

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:DATA PN9|PN11|PN15|PN20|PN23|FIX4|
"<file name>"|EXT|P4|P8|P16|P32|P64|PRAM
[:SOURce]:RADio:TETRa:DATA?
```

This command sets the data pattern for unframed transmission.

***RST** PN23

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **Ext**

4 1’s & 4 0’s **8 1’s & 8 0’s** **16 1’s & 16 0’s** **32 1’s & 32 0’s**

64 1’s & 64 0’s **PRAM File**

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:DATA:PRAM

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:DATA:PRAM "<file_name>"
[:SOURce]:RADio:TETRa:DATA:PRAM?
```

This command selects a pattern RAM (PRAM) file as the pattern data type for the TETRa (Trans-European Trunked Radio) format.

`"<file_name>"` This variable designates the PRAM file in WFM1. Refer to "File Name Variables" on page 13 for information on the file name syntax.

Key Entry **PRAM File**

Remarks Selecting this data source forces the burst source to `INTernal` to allow framing control.

The PRAM file must reside in the signal generator's volatile memory (WFM1) in order to be accessed by this command. For more information on PRAM files, refer to ":DATA:PRAM:FILE:BLOCk" on page 112.

:DATA:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:DATA:FIX4 <val>
[:SOURce]:RADio:TETRa:DATA:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern for unframed transmission according to the modulation type, symbol rate, filter, and burst shape selected for the TETRa modulation format.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type. To change the data type, refer to ":DATA" on page 994.

:DEFault

Supported E4438C with Option 402

`[:SOURce]:RADio:TETRa:DEFault`

This command returns all of the TETRA modulation format parameters to factory settings. It does not affect any other signal generator parameters.

Key Entry Restore TETRA Factory Default

:EDATa:DELay

Supported E4438C with Option 402

`[:SOURce]:RADio:TETRa:EDATa:DELay?`

This query returns the amount of delay (in symbols) from the external data input to the beginning of the symbol on the I OUT and Q OUT rear panel connectors and the front panel RF OUTPUT connector.

Remarks When the format is turned off, the delay value is unchanged; the query will return the same delay value if the format is on or off.

:EDCLock

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:EDCLock SYMBol|NORMal
[:SOURce]:RADio:TETRa:EDCLock?
```

This command sets the external data clock use.

SYMBol This choice specifies that a continuous symbol clock signal must be provided to the SYMBOL SYNC input connector.

NORMal This choice specifies that the DATA CLOCK input connector requires a bit clock. The SYMBOL SYNC input connector requires a (one-shot or continuous) symbol sync signal.

***RST** NORM

Key Entry **Ext Data Clock Normal Symbol**

Remarks Both choices have no effect in internal clock mode. Refer to “:BBCLock” on page 984 to select EXT as the data clock type.

:EREFerence

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:EREFerence INT|EXT
[:SOURce]:RADio:TETRa:EREFerence?
```

This command selects either an internal or external bit-clock reference for the data generator.

***RST** INT

Key Entry **BBG Ref Ext Int**

Remarks If the EXT choice is selected, the external source’s frequency value

must be applied to the BASEBAND GEN REF IN rear panel connector. The external reference and external data clock are not applicable at the same time. If both are selected, then the external reference takes precedence.

Refer to, “:EREFerence:VALue” on page 997 to enter the external reference frequency setting.

:EREFerence:VALue

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:EREFerence:VALue <val>
[:SOURce]:RADio:TETRa:EREFerence:VALue?
```

This command sets the expected bit-clock reference frequency value for an externally applied reference signal.

The variable `<val>` is expressed in units of hertz (Hz–MHz).

***RST** +1.30000000E+007

Range 2.5E5–1E8

Key Entry **Ext BBG Ref Freq**

Remarks The value specified by this command is effective only when you are using an external reference applied to the BASEBAND GEN REF IN rear panel connector.

Refer to “:EREFerence” on page 997 to select EXT (external source) as the reference for the bit-clock.

:FILTer

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:FILTer RNYQuist|NYQuist|GAUSsian|RECTangle|
IS95|IS95_EQ|IS95_MOD|IS95_MOD_EQ|AC4Fm|UGGaussian|"<user FIR>"
[:SOURce]:RADio:TETRa:FILTer?
```

This command selects the pre-modulation filter type.

IS95	This choice selects a filter that meets the criteria of the IS-95 standard.
IS95_EQ	This choice selects a filter which is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard. This filter is only used for IS-95 baseband filtering.
IS95_MOD	This choice selects a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.
IS95_MOD_EQ	This choice selects a filter which is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance), with lower passband rejection.
AC4Fm	This choice selects a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.
UGGaussian	This choice selects a backwards compatible GSM Gaussian filter (Gaussian filter with a fixed BbT value of 0.300) for the ESG E44xxB Option UN3 or UN4.
`"<user FIR>"`	This variable is any filter file that you have stored into memory.
***RST**	RNYQ
Key Entry	**Root Nyquist** **Nyquist** **Gaussian** **Rectangle** **IS-95** **IS-95 w/EQ** **IS-95 Mod** **IS-95 Mod w/EQ** **APCO 25 C4FM** **UN3/4 GSM Gaussian** **User FIR**
Remarks	Refer to “File Name Variables” on page 13 for information on the file name syntax.

:IQ:SCALe

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:IQ:SCALe <val>
[:SOURce]:RADio:TETRa:IQ:SCALe?
```

This command sets the amplitude of the I/Q outputs for better adjacent channel power (ACP); lower scaling values equate to better ACP.

The variable `<val>` is expressed in units of percent.

***RST** +65

Range 1–200

Key Entry **I/Q Scaling**

Remarks This command has no effect with MSK or FSK modulation.

:MODulation:FSK[:DEViation]

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:MODulation:FSK[:DEViation] <val>
[:SOURce]:RADio:TETRa:MODulation:FSK[:DEViation]?
```

This command sets the symmetric FSK frequency deviation value.

The variable `<val>` is expressed in units of Hertz and the maximum range value equals the current symbol rate value multiplied by four, limited to 20 MHz.

***RST** +4.00000000E+002

Range 0–2E7

Key Entry **Freq Dev**

Remarks To change the modulation type, refer to ":MODulation[:TYPE]" on page 1001.

Refer to ":SRATe" on page 972 for a list of the minimum and maximum symbol rate values.

To set an asymmetric FSK deviation value, refer to the *E4428C/38C ESG Signal Generators User's Guide* for more information.

:MODulation:MSK[:PHASe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:MODulation:MSK[:PHASe] <val>
[:SOURce]:RADio:TETRa:MODulation:MSK[:PHASe]?
```

This command sets the MSK phase deviation value.

The variable `<val>` is expressed in units of degrees.

***RST** +9.00000000E+001

Range 0–100

Key Entry **Phase Dev**

:MODulation:UFSK

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:MODulation:UFSK "<file name>"
[:SOURce]:RADio:TETRa:MODulation:UFSK?
```

This command selects a user-defined FSK file from the signal generator memory.

Key Entry **User FSK**

Remarks The user-defined FSK file is held in signal generator memory until the command that selects user FSK as the modulation type is sent. Refer to ":MODulation[:TYPE]" on page 1001 to change the current modulation type.

Refer to "File Name Variables" on page 13 for information on the file name syntax.

:MODulation:UIQ

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:MODulation:UIQ "<file name>"
[:SOURce]:RADio:TETRa:MODulation:UIQ?
```

This command selects a user-defined I/Q file from the signal generator memory.

Key Entry **User I/Q**

Remarks The user-defined I/Q file is held in signal generator memory until the command that selects user I/Q as the modulation type is sent. Refer to ":MODulation[:TYPE]" on page 1001 to change the current modulation type.

Refer to "File Name Variables" on page 13 for information on the file name syntax.

:MODulation[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:MODulation[:TYPE] BPSK|QPSK|IS95QPSK|
GRAYQPSK|OQPSK|IS95OQPSK|P4DQPSK|PSK8|PSK16|D8PSK|MSK|FSK2|FSK4|
FSK8|FSK16|C4FM|QAM4|QAM16|QAM32|QAM64|QAM128|QAM256|UIQ|UFSK
[:SOURce]:RADio:TETRa:MODulation[:TYPE]?
```

This command sets the modulation type for the TETRA personality.

***RST** P4DQPSK

Key Entry **BPSK** **QPSK** **IS-95 QPSK** **Gray Coded QPSK** **OQPSK**

IS-95 OQPSK **π/4 DQPSK** **8PSK** **16PSK** **D8PSK** **MSK** **2-Lvl FSK**

4-Lvl FSK **8-Lvl FSK** **16-Lvl FSK** **C4FM** **4QAM** **16QAM** **32QAM**

64QAM **128QAM** **256QAM** **User I/Q** **User FSK**

:POLarity[:ALL]

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:POLarity[:ALL] NORMal|INVerted
[:SOURce]:RADio:TETRa:POLarity[:ALL]?
```

This command sets the rotation direction of the phase modulation vector.

NORMal This choice selects normal phase polarity.

INVerted This choice inverts the internal Q signal.

***RST** NORM

Key Entry **Phase Polarity Normal Invert**

:SECondary:RECall

Supported E4438C with Option 402

`[:SOURce]:RADio:TETRa:SECondary:RECall`

This command recalls the secondary frame configuration, overwriting the current state.

Key Entry **Recall Secondary Frame State**

Remarks To save a secondary frame state, refer to ":SECondary:SAVE" on page 1002.

A secondary frame is not active until the secondary state is enabled. To activate a secondary frame, refer to ":SECondary[:STATe]" on page 1003.

:SECondary:SAVE

Supported E4438C with Option 402

`[:SOURce]:RADio:TETRa:SECondary:SAVE`

This command saves the current frame configuration as the secondary frame with the file name `TETRa_SECONDARY_FRAME`.

Key Entry **Save Secondary Frame State**

Remarks To recall the secondary frame (saved in non-volatile signal generator memory), refer to ":SECondary:RECall" on page 1002.

:SECondary:TRIGger[:SOURce]

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SECondary:TRIGger[:SOURce] KEY|EXT|BUS
[:SOURce]:RADio:TETRa:SECondary:TRIGger[:SOURce]?
```

This command selects the type of triggering for the secondary frame.

KEY This choice enables triggering by pressing the front panel **Trigger** hardkey.

EXT This choice enables triggering using an externally applied signal at the PATT TRIG IN rear panel connector or the PATT TRIG IN 2 pin on the rear panel AUX I/O connector. To select the appropriate connector, refer to ":TRIGger[:SOURce]:EXTernal[:SOURce]" on page 1026.

BUS This choice enables GPIB triggering using the `*TRG` or `GET` command or LAN and RS-232 triggering using the `*TRG` command.

Key Entry **Trigger Key** **Ext** **Bus**

:SECondary[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SECondary[:STATe] ON|OFF|1|0
[:SOURce]:RADio:TETRa:SECondary[:STATe]?
```

This command enables or disables the ability to switch to the secondary frame.

***RST** 0

Key Entry **Secondary Frame Off On**

Remarks A frame must already be saved as the secondary frame in order to turn the secondary state function on.

To save a frame as the secondary frame, refer to ":SECondary:SAVE" on page 1002.

:SLOT[1]|2|3|4:DCCustom

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCCustom PN9|PN11|PN15|
PN20|PN23|FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCCustom?
```

This command configures the downlink continuous custom timeslot data field.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1's & 4 0's **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's**

64 1's & 64 0's

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:SLOT[1]|2|3|4:DCCustom:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCCustom:FIX4 <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCCustom:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected downlink continuous custom timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type.

:DCNormal:B1

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCNormal:B1 <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCNormal:B1?
```

This command sets the first 14 broadcast bits for the selected downlink continuous normal timeslot.

***RST** #H0000

Range #H0–#H3FFF

Key Entry **B1**

:DCNormal:B2

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCNormal:B2 <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCNormal:B2?
```

This command sets the last 16 broadcast bits for the selected downlink continuous normal timeslot.

***RST** #H0000

Range #H0–#HFFFF

Key Entry **B2**

:SLOT[1]|2|3|4:DCNormal:TSEQuence

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCNormal:
TSEQuence <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCNormal:TSEQuence?
```

This command sets the normal training sequence bits (30-bit mid-amble) for the selected downlink continuous normal timeslot.

***RST** #H343A74

Range #H0–#H3FFFFF

Key Entry **TS**

Remarks When 1E90DE is selected, the data fields are scrambled as separate logical channels.

:SLOT[1]|2|3|4:DCNormal[:DATA]

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCNormal[:DATA] PN9|PN11|
PN15|PN20|PN23|FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCNormal[:DATA]?
```

This command configures the selected downlink continuous normal timeslot data field.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1's & 4 0's **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's**

64 1's & 64 0's

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:SLOT[1]|2|3|4:DCNormal[:DATA]:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCNormal[:DATA]:FIX4 <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCNormal[:DATA]:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected downlink continuous normal timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type.

:SLOT[1]|2|3|4:DCSync:B

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCSync:B <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCSync:B?
```

This command sets the broadcast bits for the selected downlink continuous synchronization timeslot.

***RST** #H00000000

Range #H0–#H3FFFFFFF

Key Entry **B**

:SLOT[1]|2|3|4:DCSync:FCOR

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCSync:FCOR <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCSync:FCOR?
```

This command sets the frequency correction bits for the selected downlink continuous synchronization timeslot.

***RST** #HFF0000000000000000FF

Range #H0–#HFFFFFFFFFFFFFFFFFFFF

Key Entry **FCOR**

:SLOT[1]|2|3|4:DCSync:SSB

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCSync:SSB <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCSync:SSB?
```

This command sets the synchronization block bits for the selected downlink synchronization continuous timeslot.

***RST** #H0000000000000000000000000000

Range #H0–#HFFFFFFFFFFFFFFFFFFFFFFFFFFFF

Key Entry **SSB**

:SLOT[1]|2|3|4:DCSync:STS

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCSync:STS <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCSync:STS?
```

This command sets the synchronization training sequence for the selected downlink continuous synchronization timeslot.

***RST** #H30673A7067

Range #H0–#H3FFFFFFFFF

Key Entry **STS**

:SLOT[1]|2|3|4:DCSync[:DATA]

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCSync[:DATA] PN9|PN11|
PN15|PN20|PN23FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCSync[:DATA]?
```

This command configures the selected downlink continuous synchronization timeslot data field.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1's & 4 0's **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's**

64 1's & 64 0's

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:SLOT[1]|2|3|4:DCSync[:DATA]:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCSync[:DATA]:FIX4 <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DCSync[:DATA]:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected downlink continuous synchronization timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type.

:SLOT[1]|2|3|4:DDCustom

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDCustom PN9|PN11|PN15|
PN20|PN23|FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDCustom?
```

This command configures the downlink discontinuous custom timeslot data field.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1's & 4 0's **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's**

64 1's & 64 0's

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:SLOT[1]|2|3|4:DDCustom:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDCustom:FIX4 <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDCustom:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected downlink discontinuous custom timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type.

:SLOT[1]|2|3|4:DDNormal:B1

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDNormal:B1 <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDNormal:B1?
```

This command sets the first 14 broadcast bits for the selected downlink discontinuous normal timeslot.

***RST** #H0000

Range #H0–#H3FFF

Key Entry **B1**

:SLOT[1]|2|3|4:DDNormal:B2

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDNormal:B2 <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDNormal:B2?
```

This command sets the last 16 broadcast bits for the selected downlink continuous normal timeslot.

***RST** #H0000

Range #H0–#HFFFF

Key Entry **B2**

:SLOT[1]|2|3|4:DDNormal:TSEQuence

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDNormal:TSEQuence <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDNormal:TSEQuence?
```

This command specifies the normal training sequence bits (30-bit mid-amble) for the selected downlink discontinuous normal timeslot.

***RST** #H343A74

Range #H0–#H3FFFFFFF

Key Entry **TS**

Remarks When 1E90DE is selected, the data fields are scrambled as separate logical channels.

:SLOT[1]|2|3|4:DDNormal[:DATA]

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDNormal[:DATA] PN9|PN11|
PN15|PN20|PN23FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDNormal[:DATA]?
```

This command configures the selected downlink discontinuous normal timeslot data field.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1’s & 4 0’s **8 1’s & 8 0’s** **16 1’s & 16 0’s** **32 1’s & 32 0’s**

64 1’s & 64 0’s

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:SLOT[1]|2|3|4:DDNormal[:DATA]:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDNormal[:DATA]:FIX4 <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDNormal[:DATA]:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected downlink discontinuous normal timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type.

:SLOT[1]|2|3|4:DDSync:B

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDSync:B <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDSync:B?
```

This command sets the broadcast bits for the selected downlink discontinuous synchronization timeslot.

***RST** #H00000000

Range #H0–#H3FFFFFFF

Key Entry **B**

:SLOT[1]|2|3|4:DDSync:FCOR

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDSync:FCOR <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDSync:FCOR?
```

This command sets the frequency correction bits for the selected downlink discontinuous synchronization timeslot.

***RST** #HFF0000000000000000FF

Range #H0–#HFFFFFFFFFFFFFFFFFFFF

Key Entry **FCOR**

:SLOT[1]|2|3|4:DDSync:SSB

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDSync:SSB <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDSync:SSB?
```

This command sets the synchronization block bits for the selected downlink synchronization discontinuous timeslot.

***RST** #H000000000000000000000000000000

Range #H0–#HFFFFFFFFFFFFFFFFFFFFFFFFFFFF

Key Entry **SSB**

:SLOT[1]|2|3|4:DDSync:STS

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDSync:STS <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDSync:STS?
```

This command sets the synchronization training sequence for the selected downlink discontinuous synchronization timeslot.

***RST** #H30673A7067

Range #H0–#H3FFFFFFFFF

Key Entry **STS**

:SLOT[1]|2|3|4:DDSync[:DATA]

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDSync[:DATA] PN9|PN11|
PN15|PN20|PN23|FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDSync[:DATA]?
```

This command configures the selected downlink discontinuous synchronization timeslot data field.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1's & 4 0's **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's**

64 1's & 64 0's

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:SLOT[1]|2|3|4:DDSync[:DATA]:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDSync[:DATA]:FIX4 <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:DDSync[:DATA]:FIX4?
```

This command sets the binary, 4-bit repeating sequence data pattern that is used in the selected downlink discontinuous synchronization timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

Remarks FIX4 must already be defined as the data type. To change the data type, refer to “:SLOT[1]|2|3|4:DCNormal[:DATA]” on page 1005.

:SLOT[1]|2|3|4:POWer

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:POWer MAIN|DELTa
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:POWer?
```

This command toggles the RF output power level function for the selected timeslot.

MAIN This choice specifies RF output as the main power level.

DELTa This choice specifies RF output as the alternative power level.

***RST** MAIN

Key Entry **Timeslot Ampl Main Delta**

:SLOT[1]|2|3|4:STATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:STATe ON|OFF|1|0
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:STATe?
```

This command enables or disables the selected timeslot.

***RST** Timeslot 1: 1 Timeslot 2-4:

Key Entry **Timeslot Off On**

Remarks Continuous timeslots cannot be disabled.

:SLOT[1]|2|3|4:UC1:TSEQuence

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UC1:TSEQuence <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UC1:TSEQuence?
```

This command specifies the extended training sequence bits (30-bit mid-amble) for the selected uplink control 1 timeslot.

***RST** #H2743A743

Range #H0–#H3FFFFFFF

Key Entry **TS**

:SLOT[1]|2|3|4:UC1[:DATA]

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UC1[:DATA] PN9|PN11|PN15|
PN20|PN23|FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UC1[:DATA]?
```

This command configures the selected uplink control 1 data field.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1's & 4 0's **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's**

64 1's & 64 0's

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:SLOT[1]|2|3|4:UC1[:DATA]:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UC1[:DATA]:FIX4 <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UC1[:DATA]:FIX4?
```

This command configures the uplink control 1 data field FIX4 value for the selected timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

:SLOT[1]|2|3|4:UC2:TSEQuence

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UC2:TSEQuence <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UC2:TSEQuence?
```

This command specifies the extended training sequence bits (30-bit mid-amble) for the selected uplink control 2 timeslot.

***RST** #H2743A743

Range #H0–#H3FFFFF

Key Entry **TS**

:SLOT[1]|2|3|4:UC2[:DATA]

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UC2[:DATA] PN9|PN11|PN15|
PN20|PN23|FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UC2[:DATA]?
```

This command configures the selected uplink control 2 data field.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1's & 4 0's **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's**

64 1's & 64 0's

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:SLOT[1]|2|3|4:UC2[:DATA]:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UC2[:DATA]:FIX4 <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UC2[:DATA]:FIX4?
```

This command configures the uplink control 2 data field FIX4 value for the selected timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

:SLOT[1]|2|3|4:UCUStom

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UCUStom PN9|PN11|PN15|
PN20|PN23|FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UCUStom?
```

This command configures the uplink custom data field.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1's & 4 0's **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's**

64 1's & 64 0's

Remarks See "File Name Variables" on page 13 for information on the file name syntax.

:SLOT[1]|2|3|4:UCUStom:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UCUStom:FIX4 <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UCUStom:FIX4?
```

This command configures the uplink custom data field to FIX4 (4-bit repeating sequence data pattern).

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

:SLOT[1]|2|3|4:UNORmal:TSEQuence

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UNORmal:TSEQuence <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UNORmal:TSEQuence?
```

This command specifies the extended training sequence bits (22-bit mid-amble) for the selected uplink normal timeslot.

***RST** #H343A74

Range #H0–#H3FFFFF

Key Entry **TS**

Remarks When 1E90DE is selected, data fields are scrambled as separate logical channels.

:SLOT[1]|2|3|4:UNORmal[:DATA]

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UNORmal[:DATA] PN9|PN11|
PN15|PN20|PN23|FIX4|"<file name>"|EXT|P4|P8|P16|P32|P64
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UNORmal[:DATA]?
```

This command configures the selected uplink normal data field.

***RST** PN9

Key Entry **PN9** **PN11** **PN15** **PN20** **PN23** **FIX4** **User File** **EXT**

4 1's & 4 0's **8 1's & 8 0's** **16 1's & 16 0's** **32 1's & 32 0's**

64 1's & 64 0's

Remarks Refer to "File Name Variables" on page 13 for information on the file name syntax.

:SLOT[1]|2|3|4:UNORmal[:DATA]:FIX4

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UNORmal[:DATA]:FIX4 <val>
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4:UNORmal[:DATA]:FIX4?
```

This command configures the uplink normal data field FIX4 value for the selected timeslot.

***RST** #B0000

Range #B0000–#B1111 or 0–15

Key Entry **FIX4**

:SLOT[1]|2|3|4[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4[:TYPE] UCUStom|UC1|UC2|
UNORmal|DDNormal|DDSync|DCNormal|DCSync|DCCustom|DDCustom
[:SOURce]:RADio:TETRa:SLOT[1]|2|3|4[:TYPE]?
```

This command sets the timeslot type for the selected timeslot.

***RST** *Timeslot 1*: UCUS *Timeslot 2-4*: UNOR

Key Entry **Up Custom** **Up Control 1** **Up Control 2** **Up Normal** **Dn Normal Disc**

Dn Sync Disc **Dn Normal Cont** **Dn Sync Cont** **Dn Custom Cont**

Dn Custom Disc

Remarks When downlink is selected and the frame is uplink, the following mapping is made to convert the uplink protocols to downlink; an error will be generated.

From	To (Continuous Downlink)	To (Discontinuous Downlink)
UC1	DCCustom	DDCustom
UC2	DCCustom	DDCustom
UCUSTom	DCCustom	DDCustom
UNORmal	DCNormal	DDNormal

When uplink is selected and the frame is downlink, the following mapping is made to convert the downlink protocols to uplink; an error will be generated.

From	To
DCCustom/ DDCustom	UCUSTom
DCNormal/ DDNormal	UNORmal
DCSync/ DDSync	UCUSTom

When continuous downlink protocols are selected, all timeslots must be on, and they cannot be turned off. Any attempts to do so will generate an error.

:SOUT

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SOUT FRAME|SLOT|ALL
[:SOURce]:RADio:TETRa:SOUT?
```

This command sets the synchronization location (within the pattern of data) and the type of output at the EVENT 1 rear panel connector.

FRAME This choice outputs a 1-bit signal, synchronized to the bit selected by the synchronization output offset command, for a framed data pattern.

SLOT This choice outputs a 1-bit signal, synchronized to the bit selected by the synchronization output offset command, for a selected timeslot.

ALL This choice outputs a 1-bit signal, synchronized to the bit selected by the synchronization output offset command, for all active timeslots.

***RST** FRAME

Key Entry **Begin Frame** **Begin Timeslot #** **All Timeslots**

Remarks See ":SOUT:OFFSet" on page 1019 to change the synchronization output offset.

:SOUT:OFFSet

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SOUT:OFFSet <val>
[:SOURce]:RADio:TETRa:SOUT:OFFSet?
```

This command sets the offset value for the location of the output synchronization signal on the EVENT1 rear panel connector relative to the beginning of the framed data pattern or timeslot.

The variable `<val>` is expressed as a number of bits.

***RST**	+0
Range	–509 to 509
Key Entry	**Sync Out Offset**
Remarks	Negative values move the synchronization output signal earlier; positive values move it later. To change the output of the EVENT1 rear panel connector to SLOT, refer to ":SOUT" on page 1019.

:SOUT:SLOT

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:SOUT:SLOT <val>
[:SOURce]:RADio:TETRa:SOUT:SLOT?
```

This command selects the timeslot that will trigger a 1-bit output signal at the EVENT 1 rear panel connector.

***RST**	+1
Range	1–4
Key Entry	**Begin Timeslot #**
Remarks	SLOT must be selected as the output signal type for the EVENT 1 rear panel connector. To change the output of the EVENT1 rear panel connector to SLOT, refer to ":SOUT" on page 1019.

:SRATe

Supported E4438C with Option 001/601or 002/602

```
[:SOURce]:RADio:TETRa:SRATe <val>
[:SOURce]:RADio:TETRa:SRATe?
```

This command sets the transmission symbol rate. Symbol rate is the bit rate divided by the bits per symbol. A change in the symbol rate affects the bit rate. Refer to ":BRATe" on page 985 for information on bit rate.

The variable `<val>` is expressed in units of symbols per second (sps–Msps) and the maximum symbol rate depends on the filter. Refer to ":FILTer" on page 998 for minimum filter symbol width.

The filter may have to be truncated down to 32 or 16 symbols wide to achieve the highest symbol rate. The signal generator's internal filters are not truncated below their minimum filter length and user-defined FIR filters are not truncated. If the filter cannot be truncated then the symbol rate is limited to the maximum rate of the narrowest filter size possible.

The relative timing of the modulated data, as well as the actual filter response is affected when the filter is truncated.

When the symbol rate changes, the ESG reconfigures the baseband generator. The time required to reconfigure the baseband generator is inversely proportional to the symbol rate: lower symbol rates require more time.

To change the modulation type, refer to ":MODulation[:TYPE]" on page 1001.

***RST** +1.80000000E+004

Range

Modulation Type	**Symbol Rate Range**		
	16 Symbol Wide Filter	*32 Symbol Wide Filter*	*64 Symbol Wide Filter*
BPSK, FSK2, MSK	1sps–50Msps	1sps–25Msps	1sps–12.5Msps
C4FM, OQPSK, FSK4 OQPSKI95, QPSK P4QPPSK, QPSKIS95 GRAYQPSK, QAM4	2sps–25Msps	2sps–12.5Msps	2sps–6.25Msps
D8PSK, EDGE, FSK8, PSK8	3sps–16.666666666 Msps	3sps–8.333333333 Msps	3sps–4.166666666Msps
FSK16, PSK16, QAM16	4sps–12.5Msps	4sps–6.25Msps	4sps–3.125Msps
QAM32	5sps–10Msps	5sps–5Msps	5sps–2.5Msps
QAM64	6sps–8.333333333 Msps	6sps–4.166666666 Msps	6sps–2.083333333 Msps
QAM128	7sps–7.142857142 Msps	7sps–3.571428572 Msps	7sps–1.785714285 Msps
QAM256	8sps–6.25Msps	8sps–3.125 Msps	8sps–1.5625 Msps

NOTE Using I/Q skew will half the minimum number of symbols for the selected filter.

Key Entry **Symbol Rate**

:TRIGger:TYPE

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:TRIGger:TYPE CONTinuous|SINGle|GATE
[:SOURce]:RADio:TETRa:TRIGger:TYPE?
```

This command sets the trigger type.

CONTinuous The framed data sequence repeats continuously; the sequence restarts every time the previous playback is completed. To customize continuous triggering, refer to ":TRIGger:TYPE:CONTinuous[:TYPE]" on page 1022.

SINGle The framed data sequence plays once for every trigger received.

GATE An external trigger signal interrupts the playback while the gating signal is in the inactive state. Playback resumes when the external control signal returns to the active state. The active state can be set to high or low.

***RST** CONT

Key Entry **Continuous** **Single** **Gated**

:TRIGger:TYPE:CONTinuous[:TYPE]

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:TRIGger:TYPE:CONTinuous[:TYPE] FREE|
TRIGger|RESet
[:SOURce]:RADio:TETRa:TRIGger:TYPE:CONTinuous[:TYPE]?
```

This commands selects the waveform's response to a trigger signal while using the continuous trigger mode.

For more information on triggering and to select the continuous trigger mode, see ":TRIGger:TYPE" on page 1022.

The following list describes the waveform's response to each of the command choices:

FREE Turning the ARB format on immediately triggers the waveform. The waveform repeats until you turn the format off, select another trigger, or choose another waveform file.

TRIGger The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously until you turn the format off, select another trigger, or choose another waveform file.

RESet	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously. Subsequent triggers reset the waveform to the beginning. For a waveform sequence, this means to the beginning of the first segment in the sequence.
***RST**	FREE
Key Entry	**Free Run** **Trigger & Run** **Reset & Run**

:TRIGger:TYPE:GATE:ACTive

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:TRIGger:TYPE:GATE:ACTive LOW|HIGH
[:SOURce]:RADio:TETRa:TRIGger:TYPE:GATE:ACTive?
```

This command selects the active state (gate polarity) of the gate while using the gating trigger mode.

The LOW and HIGH selections correspond to the low and high states of an external trigger signal. For example, when you select HIGH, the active state occurs during the high of the trigger signal. When the active state occurs, the ESG stops the waveform playback at the last played sample point, then restarts the playback at the next sample point when the inactive state occurs. For more information on triggering and to select gating as the trigger mode, see ":TRIGger:TYPE" on page 1022.

The following list describes the ESG's gating behavior for the polarity selections:

LOW	The waveform playback stops when the trigger signal goes low (active state) and restarts when the trigger signal goes high (inactive state).
HIGH	The waveform playback stops when the trigger signal goes high (active state) and restarts when the trigger signal goes low (inactive state).
***RST**	HIGH
Key Entry	**Gate Active Low High**

:TRIGger[:SOURce]

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:TRIGger[:SOURce] KEY|EXT|BUS
[:SOURce]:RADio:TETRa:TRIGger[:SOURce]?
```

This command sets the trigger source.

For more information on triggering, see ":TRIGger:TYPE" on page 1022. The following list describes the command choices:

KEY This choice enables manual triggering by pressing the front-panel **Trigger** hardkey.

EXT An externally applied signal triggers the waveform. This is the only choice that works with gating. The following conditions affect an external trigger:

- The input connector selected for the trigger signal. You have a choice between the rear-panel PATTERN TRIG IN connector or the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector. To make the connector selection, see ":TRIGger[:SOURce]:EXTernal[:SOURce]" on page 1026.

  For more information on the connectors and on connecting the cables, see the *E4428C/38C ESG Signal Generators User's Guide*.

- The trigger signal polarity:
  - gating mode, see ":TRIGger:TYPE:GATE:ACTive" on page 1023
  - continuous and single modes, see ":TRIGger[:SOURce]:EXTernal:SLOPe" on page 1026

- The time delay between when the ESG receives a trigger and when the waveform responds to the trigger. There are two parts to setting the delay:
  - setting the amount of delay, see ":TRIGger[:SOURce]:EXTernal:DELay" on page 1025
  - turning the delay on, see ":TRIGger[:SOURce]:EXTernal:DELay:STATe" on page 1025

BUS This choice enables triggering over the GPIB or LAN using the `*TRG` or `GET` commands or the AUXILIARY INTERFACE (RS-232) using the `*TRG` command.

***RST** KEY

Key Entry **Trigger Key** **Ext** **Bus**

:TRIGger[:SOURce]:EXTernal:DELay

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:TRIGger[:SOURce]:EXTernal:DELay <val>
[:SOURce]:RADio:TETRa:TRIGger[:SOURce]:EXTernal:DELay?
```

This command sets the number of bits to delay the ESG’s response to an external trigger.

The bit delay is a delay between when the ESG receives the trigger and when it responds to the trigger. The delay uses the clocks of the bit-clock to time the delay. After the ESG receives the trigger and the set number of delay bits (clocks) occurs, the ESG transmits the data pattern.

The delay occurs after you enable the state. See “:TRIGger[:SOURce]:EXTernal:DELay:STATe” on page 1025. You can set the number of bits either before or after enabling the state.

For more information on configuring an external trigger source and to select external as the trigger source, see “:TRIGger[:SOURce]” on page 1024.

***RST** +0

Range 0–1048575

Key Entry **Ext Delay Bits**

:TRIGger[:SOURce]:EXTernal:DELay:STATe

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:TRIGger[:SOURce]:EXTernal:DELay:STATe
ON|OFF|1|0
[:SOURce]:RADio:TETRa:TRIGger[:SOURce]:EXTernal:DELay:STATe?
```

This command enables or disables the operating state of the external trigger delay function.

For setting the delay time, see “:TRIGger[:SOURce]:EXTernal:DELay” on page 1025, and for more information on configuring an external source, see“:TRIGger[:SOURce]” on page 1024.

***RST** 0

Key Entry **Ext Delay Off On**

:TRIGger[:SOURce]:EXTernal:SLOPe

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:TRIGger[:SOURce]:EXTernal:SLOPe POSitive|NEGative
[:SOURce]:RADio:TETRa:TRIGger[:SOURce]:EXTernal:SLOPe?
```

This command sets the polarity for an external trigger signal while using the continuous, single triggering mode. To set the polarity for gating, see ":TRIGger:TYPE:GATE:ACTive" on page 1023.

The POSitive and NEGative selections correspond to the high (positive) and low (negative) states of the external trigger signal. For example, when you select POSitive, the waveform responds (plays) during the high state of the trigger signal. When the ESG receives multiple trigger occurrences when only one is required, the signal generator uses the first trigger and ignores the rest.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 1024.

***RST** NEG

Key Entry **Ext Polarity Neg Pos**

:TRIGger[:SOURce]:EXTernal[:SOURce]

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa:TRIGger[:SOURce]:EXTernal[:SOURce] EPT1|
EPT2|EPTRIGGER1|EPTRIGGER2
[:SOURce]:RADio:TETRa:TRIGger[:SOURce]:EXTernal[:SOURce]?
```

This command selects which PATTERN TRIG IN connection the ESG uses to accept an externally applied trigger signal when external is the trigger source selection.

For more information on configuring an external trigger source and to select external as the trigger source, see ":TRIGger[:SOURce]" on page 1024. For more information on the rear-panel connectors, see the *E4428C/38C ESG Signal Generators User's Guide*.

The following list describes the command choices:

EPT1 This choice is synonymous with EPTRIGGER1 and selects the PATTERN TRIG IN rear-panel connector.

EPT2 This choice is synonymous with EPTRIGGER2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.

EPTRIGGER1 This choice is synonymous with EPT1 and selects the PATTERN TRIG IN rear-panel connector.

EPTRIGGER2 This choice is synonymous with EPT2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.

***RST** EPT1

Key Entry **Patt Trig In 1** **Patt Trig In 2**

[:STATe]

Supported E4438C with Option 402

```
[:SOURce]:RADio:TETRa[:STATe] ON|OFF|1|0
[:SOURce]:RADio:TETRa[:STATe]?
```

This command enables or disables the TETRA modulation format.

***RST** OFF

Key Entry TETRA Off On

Remarks Although the TETRA modulation is enabled with this command, the

RF carrier is not modulated unless you also activate the front panel **Mod On/Off** hardkey.

Wideband CDMA Base Band Generator Subsystem–Option 400 ([:SOURce]:RADio:WCDMa:TGPP[:BBG])

:BBCLock

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:BBCLock INT[1]|EXT[1]
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:BBCLock?
```

This command selects the baseband generator chip clock source for the radio uplink channel.

***RST** INT

Key Entry **BBG Chip Clock Ext Int**

Remarks Refer to ":BBCLock:EXT:RATE" on page 1028 for the EXT clock rate selections.

:BBCLock:EXT:RATE

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:BBCLock:EXT:RATE X1|X2|X4
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:BBCLock:EXT:RATE?
```

This command sets the external clock rate for the baseband generator.

X1 This choice sets an external clock rate that is identical to the chip clock (3.84 MHz).

X2 This choice sets an external clock rate that is two times the rate of the chip clock.

X4 This choice sets an external clock rate that is four times the rate of the chip clock.

***RST** X1

Key Entry **Ext Clock Rate x1 x2 x4**

Remarks This command only applies to uplink.

:DLINk:APPLy

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:APPLy
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:APPLy?
```

This command immediately starts the channel coding generation process according to the channel setup and data entered for the downlink physical and transport channels.

Key Entry **Apply Channel Setup**

Remarks If pre-computing is required, then a progress bar will appear on the signal generator’s display.

:DLINk:AWGN:CN

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:AWGN:CN <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:AWGN:CN?
```

This command sets the in band carrier to noise ratio (C/N) value in the AWGN carrier to noise.

***RST** –10.2

Range –20 to 20

Field Entry `C/N value`

:DLINk:AWGN:CPOWer

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:AWGN:CPOWer?
```

This query returns the carrier power of the RF signal.

***RST** 0

Field Entry `C Power`

:DLINk:AWGN:ECNO

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:AWGN:ECNO <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:AWGN:ECNO?
```

This command sets the Ec/No value of the Ec Ref channel.

The variable `<val>` is expressed in decibels (dB).

***RST** 0

Range –30 to 30

Field Entry `Ec/No value`

:DLINk:AWGN:ECRPower

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:AWGN:ECRPower?
```

This query returns the carrier noise power in the Ec Ref channel.

***RST** 0

Field Entry `Ec Ref Power`

:DLINk:AWGN:ECRef

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:AWGN:ECRef DPCH1|DPCH2|PCCPCH|
PICH|CPICH
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:AWGN:ECRef?
```

This command selects the reference used for the Ec/No value.

DPCH1 This choice selects 1 dedicated physical channel.

DPCH2 This choice selects 2 dedicated physical channel.

PCCPCH This choice selects a primary command control physical channel.

PICH This choice selects a paging indicator channel.

CPICH This choice selects a common pilot channel.

***RST** DPCH1

Key Entry **DPCH + 1** **DPCH + 2** **PCCPCH** **PICH** **CPICH**

Remarks White noise is a frequency spectrum that is uniform over a specific frequency band. White noise has equal power per hertz over the specific frequency band.

:DLINk:AWGN:FNBW

Supported E4438C with Option 400 and 403

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:AWGN:FNBW?`

This query returns the flat noise bandwidth value.

***RST** +6.1440000E+006

:DLINk:AWGN:NPOWer

Supported E4438C with Option 400 and 403

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:AWGN:NPOWer?`

This query returns the in-band noise power portion of the total RF power.

***RST** +0

:DLINk:AWGN:TICPower

Supported E4438C with Option 400 and 403

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:AWGN:TICPower?`

This query returns the total in-channel power (carrier with noise) as defined by the 3GPP standard.

***RST** +0

Field Entry `Total Pwr`

Remarks The total in-channel power is a sum of carrier power and in-channel noise power. Changing the noise related parameters such as C/N, Eb/No, and Eb Ref will cause a recalculation of the total in-channel power.

The maximum value returned by this query depends on the power option that is installed in the signal generator.

:DLINk:AWGN[:STATe]

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:AWGN:STATe ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:AWGN:STATe?
```

This command enables or disables the additive white gaussian noise (AWGN) physical channel.

***RST** 0

Key Entry **Channel State Off On**

:DLINk:BBCLock

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:BBCLock INT[1]|EXT[1]
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:BBCLock?
```

This command selects the baseband generator chip clock source for the channel.

***RST** INT

Key Entry **BBG Data Clock Ext Int**

:DLINk:CARB:CMODe:CCODe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:CCODe <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:CCODe?
```

This command sets the channel code for the chip ARB based dedicated physical channel (DPCH) in compressed mode.

***RST** 6

Range 0–511

Field Entry `Channel Code`

:DLINk:CARB:CMODe:DATA

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:DATA PN9|PN15
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:DATA?
```

This command sets the dedicated physical channel (DPCH) data pattern in compressed mode (CM).

***RST** PN9

Key Entry **PN9** **PN15**

Remarks The data pattern contains one frame of each normal DPCH frame with a chosen slot structure. CM is enabled via spread factor reduction using a single frame method.

:DLINk:CARB:CMODe:FOFFset

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:FOFFset <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:FOFFset?
```

This command sets the frame offset for the dedicated physical channel (DPCH) in compressed mode.

***RST** 0

Range 0–149

Field Entry `Frame Offset`

:DLINk:CARB:CMODe:FSTRuct

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:FSTRuct A|B
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:FSTRuct?
```

This command selects the frame structure for the downlink compressed mode.

A This choice maximizes the transmission gap length in a compressed frame.

B This choice optimized for power control during a compressed frame.

***RST** A

Key Entry **A** **B**

:DLINk:CARB:CMODe:POWer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:POWer <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:POWer?
```

This command sets the power for the downlink compressed mode.

The variable `<val>` is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –40 to 0

Field Entry `Power`

:DLINk:CARB:CMODe:PRATio

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:PRATio <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:PRATio?
```

This command sets the playback ratio for the downlink compressed mode.

***RST** 2

Range 0–4096

Field Entry `Playback Ratio`

Remarks The value that is set represents the number of normal frames played between each compressed frame.

For example: 1:30

30 represents the un-compressed (normal) DPCH frames. The 30 frames will be played and then 1 compressed DPCH frame. The sequence then repeats.

:DLINk:CARB:CMODe:SCTYpe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:SCTYpe NORMal|RIGHt|
LEFT
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:SCTYpe?
```

This command sets the scramble type for the downlink compressed mode.

NORMal This choice selects scramble codes 0–8191 (16 x 511 + 15 = 8191).

RIGHt	This choice selects scramble codes 8192–16383 (Normal + 8192).
LEFT	This choice selects scramble codes 16384–24575 (Normal + 16384).
***RST**	NORM
Key Entry	**Normal** **Right** **Left**

:DLINk:CARB:CMODe:SFORmat

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:SFORmat <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:SFORmat?
```

This command sets the slot format value for the dedicated physical channel (DPCH) in compressed mode. This value is used for both compressed and uncompressed frames.

***RST**	+11
Range	1–15
Field Entry	`Slot Format`

:DLINk:CARB:CMODe:SSCodeos

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:SSCodeos <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:SSCodeos?
```

This command sets the secondary scramble code offset for the dedicated physical channel (DPCH) in compressed mode.

***RST**	+0
Range	0–15
Field Entry	`SecScr Code OS`

:DLINk:CARB:CMODe:TFIRst

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:TFIRst <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:TFIRst?
```

This command sets the first slot at which a gap appears.

***RST** 7

Range 0–7

Field Entry `Tfirst`

:DLINk:CARB:CMODe:TGL

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:TGL <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe:TGL?
```

This command sets the number of slots in the gap.

***RST** 7

Range 1–7

Field Entry `Tgl`

:DLINk:CARB:CMODe[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CARB:CMODe[:STATe]?
```

This command enables or disables the downlink dedicated physical channel (DPCH) in compressed mode.

***RST** 0

Key Entry **Channel State Off On**

:DLINk:CPICh:CCODe

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CPICh:CCODe?`

This query returns the common paging indicator channel (CPICH) channel code value.

***RST** +0

Remarks The channelization code is always expected to be 0.

:DLINk:CPICh:POWer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CPICh:POWer <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CPICh:POWer?
```

This command sets the power level for the common paging indicator channel (CPICH). The variable `<val>` is expressed in units of decibels (dB).

***RST** –3.30000000E+000

Range –40 to 0

Field Entry `Power`

:DLINk:CPICh[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CPICh[:STATe]
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CPICh[:STATe]?
```

This command enables or disables the common paging indicator channel (CPICH).

***RST** 1

Key Entry **Channel State Off On**

:DLINk:CRATe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CRATe <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:CRATe?
```

This command adjusts the chip rate.

The variable `<val>` is expressed in units of cycle per second (cps).

***RST** +3.84000000E+006

Range 1000∠4250000

Field Entry `Chip Rate`

Remarks The chip rate is equivalent to the spreading rate.

:DLINk:DPCH[1]:BALance

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]:BALance <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]:BALance?
```

This command sets DPCH1 power while scaling the power of all available OCNS channels in order to maintain a total power of 0 dB.

The variable `<val>` is expressed in units of decibels (dB).

Key Entry **DPCH Channel Balance**

Remarks At least one DPCH and one OCNS channel must be on prior to channel balancing. Refer to ":DLINk:DPCH[1]|2[:STATe]" on page 1045 and ":DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16[:STATe]" on page 1050.

The command [:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]:BINitialize must be initiated prior to channel balancing.

:DLINk:DPCH[1]:BINitialize

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]:BINitialize
```

This command initializes the DPCH1 or DPCH2 power of the OCNS channel balancing.

Remarks To insure proper balancing, this command must be called before the channel balancing.

:DLINk:DPCH[1]|2:ALL[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:ALL[:STATe] ON|OFF|1|0
```

This command enables or disables both of the downlink dedicated physical channels.

Key Entry **Channel State Off On**

Remarks If the parameter is changed, the apply command must be executed after the change. Refer to “:DLINk:APPLy” on page 1029.

To query the state of the individual channel, refer to “:DLINk:DPCH[1]|2[:STATe]” on page 1045

:DLINk:DPCH[1]|2:CCODe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:CCODe <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:CCODe?
```

This command sets the downlink dedicated physical channel (DPCH) code number.

*RST DPCH 1: 10 DPCH 2: 11

Range 0–511

Field Entry `Chan Code`

Remarks The channel code is coupled with the slot format and symbol rate. Refer to “:DLINk:DPCH[1]|2:SLOTformat” on page 1042 and “:DLINk:DPCH[1]|2:SRATe” on page 1042.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:DLINk:APPLy” on page 1029.

:DLINk:DPCH[1]|2:DATA

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:DATA PN9|PN15|FIX4|
"<file name>"|TGRA|TGRB
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:DATA?
```

This command configures the data pattern for the downlink dedicated physical channel (DPCH).

TGRA	This choice selects transport channel A.
TGRB	This choice selects transport channel B.
`"<file name>"`	This variable specifies a data pattern that has been stored in memory.
***RST**	PN9
Key Entry	**PN9** **PN15** **FIX4** **“User File”** **Transp Chan A** **Transp Chan B**
Remarks	The data is now independent, on each of the DPCH channels. The data is limited to PN9 and PN15 when the DPCH is in slot format 16.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:DLINk:APPLy” on page 1029.

:DLINk:DPCH[1]|2:DATA:FIX4

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:DATA:FIX4 <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:DATA:FIX4?
```

This command sets the data type to a FIX4 pattern for the downlink dedicated physical channel (DPCH). While the variable `<val>` can be entered in binary, hexadecimal, or decimal formats, the query returns only binary values.

***RST**	#B0000
Range:	0–15
Key Entry	**FIX4**
Remarks	If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:DLINk:APPLy” on page 1029.

:DLINk:DPCH[1]|2:POWer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:DATA:POWer <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:DATA:POWer?
```

This command sets the power level for the downlink dedicated physical channel (DPCH). The variable `<val>` is expressed in units of decibels (dB).

***RST** –1.02000000E+001

Range: –40 to 0

Field Entry `Power`

:DLINK:DPCH[1]|2:RCSetup

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINK:DPCH[1]|2:RCSetup REF122|REF64|
REF144|REF384|AMR122|ISDN
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINK:DPCH[1]|2:RCSetup?
```

This command selects the downlink DCPH reference measurement setup for the transport channel.

REF122 This choice configures the transport channel per the 3GPP TS 34.121 specification for a downlink reference measurement channel with a 12.2 kbps rate.

REF64 This choice configures the transport channel per the 3GPP TS 34.121 specification for a downlink reference measurement channel with a 64 kbps rate.

REF144 This choice configures the transport channel per the 3GPP TS 34.121 specification for a downlink reference measurement channel with a 144 kbps rate.

REF384 This choice configures the transport channel per the 3GPP TS 34.121 specification for a downlink reference measurement channel with a 384 kbps rate.

AMR122 This choice configures the transport channel per the 3GPP TS 25.944 specification for a downlink reference measurement channel AMR with 12.2 kbps rate.

ISDN This choice configures the transport channel as follows: 64 kbps rate, channel 1 with 4 blocks of 640 and channel 2 with 1 block of 148 as per the 3GPP TS 25.944 specification.

Key Entry

12.2 kbps (34.121)	**64 kbps (34.121)**
144 kbps (34.121)	**384 kbps (34.121)**
AMR 12.2 (25.944)	**UDI ISDN (25.944)**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":DLINk:APPLy" on page 1029.

:DLINk:DPCH[1]|2:SLOTformat

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:DATA:SLOTformat <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:DATA:SLOTformat?
```

This command configures the slot format for the dedicated physical channel (DPCH).

***RST** 0

Range: 0–16

Field Entry `Slot Format`

Remarks The slot format is coupled with the channel code and symbol rate. The transmit power control (TPC), the transport format combination indicator (TFCI), and the Pilot bits are also set as per specification and not displayed.

For a description of slot formats, see the 3GPP Technical Specifications (TS 25.211 v3.10).

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":DLINk:APPLy" on page 1029.

:DLINk:DPCH[1]|2:SRATe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:SRATe?
```

This query returns the symbol rate for the downlink dedicated physical channel.

***RST** +7.50000000E+003

:DLINk:DPCH[1]|2:SSCodeos

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:SSCodeos <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:SSCodeos?
```

This command sets the secondary scrambling code offset for the downlink dedicated physical channel (DPCH).

***RST** +0

Range: 0–15

Field Entry `2nd Scr Offset`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":DLINk:APPLy" on page 1029.

:DLINk:DPCH[1]|2:TFCI:PATTern

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:TFCI:PATTern <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:TFCI:PATTern?
```

This command sets a 10-bit pattern for the transport format combination indicator (TFCI) for the dedicated physical channel (DPCH).

While the variable `<val>` is expressed in binary or decimal formats, the query returns only decimal values.

***RST** +0

Range: 0–1023

Field Entry `TFCI Pat`

Remarks The TFCI is optional and describes the services in use (for example, voice or data). If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":DLINk:APPLy" on page 1029.

:DLINk:DPCH[1]|2:TOFFset

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:TOFFset <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:TOFFset?
```

This command adjusts the timing offset for the dedicated physical channel (DPCH). The variable `<val>` is expressed in chips.

***RST** +0

Range: 0–149

Field Entry `tDPCH Offset`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":DLINk:APPLy" on page 1029.

:DLINk:DPCH[1]|2:TPC:NUMSteps

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:TPC:NUMSteps <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:TPC:NUMSteps?
```

This command sets the number of steps for increasing/decreasing the user’s equipment (UE) power.

***RST** +1

Range: 1–80

Field Entry `TPC Steps`

Remarks The command is used with the transmit power control (TPC) patterns up/down (UDOWn), down/up (DUP), all down(DALL), all up (UALL), external (EXT), or user file (`"<file name>"`). Refer to “:DLINk:DPCH[1]|2:TPC:PATTern”

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:DLINk:APPLy” on page 1029.

:DLINk:DPCH[1]|2:TPC:PATTern

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:TPC:PATTern UDOWn|DUP|
UALL|DALL|EXT|"<file name>"
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:TPC:PATTern?
```

This command controls the power of the user’s equipment (UE). The increase/decrease direction for UE power level changes is determined by the transmit power control (TPC) pattern.

UDOWn This choice repetitively steps up and down the TPC pattern.

DUP This choice repetitively steps down and up the TPC pattern.

UALL This choice consecutively steps up the TPC pattern.

DALL This choice consecutively steps down the TPC pattern.

EXT This choice specifies an external TPC pattern.

`"<file name>"` This choice specifies a user file.

***RST** UDOW

Key Entry **All Down** **All Up** **Down/Up** **Up/Down** **Ext** **User File**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":DLINk:APPLy" on page 1029.

:DLINk:DPCH[1]|2[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:ALL[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:DPCH[1]|2:ALL[:STATe]?
```

This command enables or disables the dedicated physical channels (DPCH1 or DPCH2).

***RST** DPCH1: 1 DPCH2: 0

Key Entry **Channel State Off On**

Remarks If the parameter is changed, the apply command must be executed after the change. Refer to ":DLINk:APPLy" on page 1029.

:DLINk:FILTer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer RNYQuist|NYQuist|GAUSsian|
RECTangle|IS95|IS95_EQ|IS95_MOD|IS95_MOD_EQ|AC4Fm|UGGaussian|
"<user FIR>"
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer?
```

This command selects the filter type for the downlink configuration.

IS95 This choice selects a filter that meets the criteria of the IS-95 standard.

IS95_EQ This choice selects a filter which is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard. This filter is only used for IS-95 baseband filtering.

IS95_MOD This choice selects a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.

IS95_MOD_EQ This choice selects a filter which is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance), with lower passband rejection.

UGGaussian This choice selects a backwards compatible GSM Gaussian filter (Gaussian filter with a fixed BbT value of 0.300) for the ESG E44xxB Option UN3 or UN4.

AC4Fm	This choice selects a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.
`"<user FIR>"`	This variable is any filter file that you have stored into memory.
***RST**	RNYQ
Key Entry	**Root Nyquist** **Nyquist** **Gaussian** **Rectangle** **IS-95** **IS-95 w/EQ** **IS-95 Mod** **IS-95 Mod w/EQ** **APCO 25 C4FM** **UN3/4 GSM Gaussian** **User FIR**
Remarks	See “File Name Variables” on page 13 for information on the file name syntax.

:DLINk:FILTer:ALPHa

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer:ALPHa <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer:ALPHa?
```

Execute this command to change the alpha value for a Nyquist or root Nyquist filter.

***RST**	+2.20000000E–001
Range	0–1
Key Entry	**Filter Alpha**
Remarks	This command is effective only after selection of a root Nyquist or Nyquist filter; it does not affect other types of filters. To change the current filter type, refer to “:DLINk:FILTer” on page 1045.

:DLINk:FILTer:BBT

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer:BBT <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer:BBT?
```

Execute this command to change the bandwidth-multiplied-by-bit-time filter parameter value.

***RST**	+5.00000000E–001
Range	0.0000–1.0
Key Entry	**Filter BbT**
Remarks	This command is effective only after selecting a Gaussian filter; it does not affect other types of filters. See “:DLINk:FILTer” on page 1045 to change the filter type.

:DLINk:FILTer:CHANnel

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer:CHANnel EVM|ACP
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:FILTer:CHANnel?
```

Execute this command to optimize a filter for minimized error vector magnitude (EVM) or for minimized adjacent channel power (ACP).

EVM This choice provides the most ideal passband.

ACP This choice improves stopband rejection. This feature only applies to root Nyquist and Nyquist filters.

***RST** EVM

Key Entry **Optimize FIR For EVM ACP**

Remarks To change the current filter type, refer to ":DLINk:FILTer" on page 1045.

:DLINk:MSYNc

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:MSYNc
```

This command generates a one shot trigger pulse to synchronize multiple ESGs. This is a command only; there is no query.

Key Entry **Multi ESG Sync Trigger**

Remarks The trigger pulse will be generated when the user assigns the DRPS42 signal to any output port.

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:ALL[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|
13|14|15|16:ALL[:STATe] ON|OFF|1|0
```

This command enables or disables all of the orthogonal channel noise simulator (OCNS) channels.

***RST** +0

Key Entry **Channel State Off On**

Remarks To query the state of the individual channel, refer to ":DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16[:STATe]" on page 1050.

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:CCODe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|
13|14|15|16:CCODe <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|
13|14|15|16:CCODE?
```

This command sets the channel code number for the downlink orthogonal channel noise simulator (OCNS).

***RST** +24

Range 0–255

Field Entry `Chan Code`

Remarks The channel code is coupled with the symbol rate. Refer to ":DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:SRATe" on page 1049.

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:DATA

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|
13|14|15|16:DATA PN9|PN15
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|
13|14|15|16:DATA?
```

This command configures the data pattern for the downlink orthogonal channel noise simulator (OCNS).

***RST** PN9

Key Entry **PN9** **PN15**

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:POWer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|
13|14|15|16:POWer <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|
13|14|15|16:POWer?
```

This command sets the power level for the orthogonal channel noise simulator (OCNS).

The variable `<val>` is expressed in units of decibels (dB).

***RST** −1.200000000E+001

Range −40 to 0

Field Entry `Power`

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:SRATe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|
13|14|15|16:SRATe <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|
13|14|15|16:SRATe?
```

This command selects the symbol rate for the orthogonal channel noise simulator (OCNS).

The choices are expressed in units of kilo symbols per second (ksps).

***RST** +1.50000000E+004

Key Entry **7.5 ksps** **15 ksps** **30 ksps** **60 ksps** **120 ksps** **240 ksps** **480 ksps** **960 ksps**

Remarks The symbol rate is coupled with the channel code. Refer to ":DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:CCODe" on page 1048.

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:SSCodeos

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|
13|14|15|16:SSCodeos <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|
13|14|15|16:SSCodeos?
```

This command sets the secondary scrambling code offset for the orthogonal channel noise simulator (OCNS).

***RST** +0

Range 0–15

Field Entry 2nd Scr Offset

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:TOFFset

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|
13|14|15|16:TOFFset <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|
13|14|15|16:TOFFset?
```

This command adjusts the timing offset for the orthogonal channel noise simulator (OCNS) channel.

***RST** +0

Range: 0–149

Field Entry `tOCNS Offset`

:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|
13|14|15|16[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|
13|14|15|16[:STATe]?
```

This command enables or disables the orthogonal channel noise simulator (OCNS) channel.

***RST** +0

Field Entry `On/Off`

:DLINk:OOSTest[:STATe]

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OOSTest[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OOSTest[:STATe]?
```

This command enables or disables the Out-of-Sync-Test mode.

***RST** 0

Key Entry **Out-of-Sync Test Off On**

Remarks When **Compressed Mode Off On** is set to On, Out-of-Sync Test mode cannot be enabled.

When **Out-of-Sync Test Off On** is set to On, ALC is automatically disabled; when **Out-of-Sync Test Off On** is set to Off, **ALC Off On** is automatically enabled.

:DLINk:OOSTest:DTXGate:POLarity

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OOSTest:DTXGate:
POLarity POSitive|NEGative
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:OOSTest:DTXGate:POLarity?
```

This command sets the multiple ESG synchronization trigger signal polarity.

***RST** POS

Key Entry **DPCH1 DTX-Gate Trigger Polarity Neg Pos**

:DLINk:PADJust

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PADJust EQUal|SCALe
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PADJust?
```

This command adjusts the code domain power levels of all downlink channels.

EQUal This choice will adjusts all channel powers to equal power settings.

SCALe This choice will scale the channel power levels so that the sum of the powers are equal to 0 dB.

***RST** EQU

Key Entry **Equal Powers** **Scale To 0dB**

:DLINk:PCCPch:BCHData

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:BCHData PN9|PN15|FIX4|
"<file name>"|TRANspch
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:BCHData?
```

This command sets the broadcast channel (BCH) data format that will be transmitted on the physical common control physical channel (PCCPCH).

TRANspch This choice selects a dedicated transport channel data pattern.

`"<file name>"` This variable specifies a data pattern that has been stored in memory.

***RST** FIX4

Key Entry **PN9** **PN15** **FIX4** **User File** **Transport CH**

:DLINk:PCCPch:BCHData:FIX4

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:BCHData:FIX4 <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:BCHData:FIX4?
```

This command sets a fixed 4-bit binary data pattern for the primary common control physical channel (PCCPCH).

While the variable `<val>` can be entered in binary, hexadecimal, or decimal formats, the query returns only binary values.

***RST** #B0000

Range 0–15

Key Entry **FIX4**

:DLINk:PCCPch:CCODe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:CCODe <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:CCODe?
```

This command sets the primary common control physical channel (PCCPCH) code to the desired code number.

***RST** +1

Range 0–255

Field Entry `Channel Code`

:DLINk:PCCPch:POWer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:POWer <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch:POWer?
```

This command sets the power level for the primary common control physical channel (PCCPCH). The variable `<val>` is expressed in units of decibels (dB).

***RST** –5.30000000E+000

Range –40 to 0

Field Entry `Power`

:DLINk:PCCPch[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PCCPch[:STATe]?
```

This command enables or disables the primary common control physical channel (PCCPCH).

***RST** 1

Key Entry **Channel State Off On**

:DLINk:PICH:CCODe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:CCODe <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:CCODe?
```

This command sets the paging indicator channel (PICH) code to the desired code number.

***RST** +3

Range 0–255

Field Entry `Channel Code`

:DLINk:PICH:DATA

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:DATA PN9|PN15|FIX4|
"<file name>"
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:DATA?
```

This command configures the data pattern for the downlink paging indicator channel (PICH).

`"<file name>"` This variable specifies a data pattern that has been stored in memory.

***RST** PN9

Key Entry **PN9** **PN15** **FIX4** **User File**

:DLINk:PICH:DATA:FIX4

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:DATA:FIX4 <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:DATA:FIX4?
```

This command sets a fixed 4-bit data pattern to be transmitted on a paging indicator channel (PICH).

While the variable `<val>` can be entered in binary, hexadecimal, or decimal formats, the query returns only binary values.

***RST** #B0000

Range 0–15

Key Entry **FIX4**

:DLINk:PICH:PIBits

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:PIBits?
```

This query returns the number of bits in the paging indicator field.

***RST** +288

Field Entry `PI Bits`

:DLINk:PICH:PINDicator

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:PINDicator?
```

This query returns the number of paging indicator fields per frame.

***RST** +144

Field Entry `Paging Indicator`

:DLINk:PICH:POWer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:POWer <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH:POWer?
```

This command sets the power level of the paging indicator channel (PICH). The variable `<val>` is expressed in units of decibels (dB)

***RST** –8.300000000E+000

Range –40 to 0

Field Entry `Power`

:DLINk:PICH[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PICH[:STATe]?
```

This command enables or disables the paging indicator channel (PICH).

***RST** 0

Key Entry **Channel State Off On**

:DLINk:POLarity

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:POLarity NORMal|INVverted
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:POLarity?
```

This command selects the phase polarity of the downlink signal.

NORMal This choice selects normal polarity.

INVerted This choice inverts the internal Q signal.

***RST** NORM

Key Entry Phase Polarity Normal Invert

:DLINk:PSCH:POWer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PSCH:POWer <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PSCH:POWer?
```

This command sets the power level for the primary synchronization physical channel (PSCH).

The variable `<val>` is expressed in units of decibels (dB).

***RST** –8.30000000E+000

Range –40 to 0

Field Entry `Power`

:DLINk:PSCH[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PSCH[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:PSCH[:STATe]?
```

This command enables or disables the primary synchronization physical channel (PSCH).

***RST** 1

Field Entry `PSCH State`

:DLINk:RPANel:INPut:ALTPower

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RPANel:INPut:ALTPower?
```

This query returns the type of signal at the alternate power input (Alt power in AUX I/O connector pin#16) for the dedicated physical channel (DPCH) mode.

***RST** NONE

Remarks When **Compressed Mode Off On** is set to On, `Compressed-mode stop-trigger Compressed-mode stop-trigger` signal is assigned to pin 16 of the rear panel AUX I/O connector. For more information about the rear panel AUX I/O connector configuration, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User’s Guide*.

:DLINk:RPANel:INPut:BBGRef

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RPANel:INPut:BBGRef?`

This query returns the type of signal at the baseband generator reference input (BASEBAND GEN REF IN, rear panel connector) for the dedicated physical channel (DPCH) mode.

***RST** CCL

Remarks The signal name is baseband generator chip clock (CCL). For more information about the rear panel connector configuration, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:DLINk:RPANel:INPut:BGATe

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RPANel:INPut:BGATe?`

This query returns the type of signal at the gate burst (BURST GATE IN, rear panel connector) for the dedicated physical channel (DPCH) mode.

***RST** SFNR

Remarks System Frame Number Reset (SFNR) is used for synchronization in a two ESG setup. This signal is used to tell where the frame starts.

:DLINk:RPANel:INPut:PTRigger1

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RPANel:INPut:PTRigger1?`

This query returns the type of signal at the pattern trigger input 1 (PATT TRIG IN, rear panel connector) for the dedicated physical channel (DPCH) mode.

***RST** MSTI

Remarks When **Compressed Mode Off On** is set to On, `Compressed-mode start-trigger` (CSTT) signal is assigned to the rear panel PATT TRIG IN connector; when **Out-of-Sync Test Off On** is set to On, `DPCH1 DTX-Gate` (DDTX) signal is assigned to the rear panel PATT TRIG IN connector.

Multiple ESG Synchronization Trigger In (MSTI) signal is used to synchronize signals from two ESGs that have different coding to simulate transmit diversity.

:DLINk:RPANel:INPut:PTRigger2

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RPANel:INPut:PTRigger2?
```

This query returns the type of signal at the pattern trigger input 2 (PATT TRIG IN 2, AUX I/O connector pin#17) for the dedicated physical channel (DPCH) mode.

***RST** TPCB

Remarks Transmit Power Control Bit (TPCB) signal is used to control the DPCH TPC bit.

:DLINk:RPANel:OUTPut:DCLock

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RPANel:OUTPut:DCLock
DRPS0|DRPS4|DPRS5|DRPS6|DRPS10|DRPS11|DRPS13|DRPS20|DRPS21|DRPS22|
DRPS23|DRPS24|DRPS25|DRPS26|DRPS28|DRPS30|DRPS32|DRPS33|DRPS34|DRPS35|
DRPS36|DRPS37|DRPS38|DRPS39|DRPS40|DRPS41|DRPS42
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RPANel:OUTPut:DCLock?
```

This command assigns a signal to the data clock output at the selected rear panel AUX I/O connector pin#6. Refer to Table 9-3 on page 1058 for command parameters for the variable and output signal names.

Table 9-3 Downlink Rear Panel Signal (DRPS) Output Type

Command Parameter	Signal Out
DRPS0	NONE
DRPS4	3.84 MHz chip clock
DRPS5	SFN reset signal
DRPS6	SFN sync pulse
DRPS10	SCH slot pulse
DRPS11	10ms Frame pulse
DRPS13	80ms Frame pulse
DRPS20	DPCH data clock with DTX
DRPS21	DPCCH TPC data clock

Table 9-3 Downlink Rear Panel Signal (DRPS) Output Type

Command Parameter	Signal Out
DRPS22	DPCCH TFCI data clock
DRPS23	DPCCH Pilot data clock
DRPS24	DPCH data stream
DRPS25	DPCH TimeSlot pulse
DRPS26	DPCH 10ms Frame Pulse
DRPS28	DPCH data clock
DRPS30	DPDCH data clock w/oDTX
DRPS32	DPCH comp Frm Indicator
DRPS33	DPCH Gap Indicator
DRPS34	PICH data clock
DRPS35	PICH data
DRPS36	PICH TimeSlot pulse
DRPS37	PICH 10ms FramePulse
DRPS38	P-CCPCH data clock
DRPS39	P-CCPCH data
DRPS40	DPCH Chip-ARB-frame-pulse
DRPS41	DPCH TPC-bits-out
DRPS42	Multi-ESG Sync Trigger Out

***RST** RPS0

Key Entry

NONE **3.84MHz chip-clk (DPRS4)** **SFN reset-signal (DPRS5)**

SFN sync-pulse (DRPS6) **SCH slot-pulse (DPRS10)**

10ms Frame Pulse (DPRS11) **80ms Frame Pulse (DPRS13)**

DPDCH data-clk with DTX (DPRS20) **DPCCH TPC data-clk (DRPS21)**

DPCCH TFC I data-clk (DRPS22) **DPCCH Pilot data-clk (DRPS23)**

DPCH data stream (DRPS24) **DPCH TimeSlot pulse (DRPS25)**

DPCH 10ms Frame-Pulse (DRPS26) **DPCH data-clk (0) (DRPS28)**

DPDCH data-clk withoutDTX (DRPS30)

DPCH Compressed Frame Indicator (DRPS32)

DPCH Gap Indicator (DRPS33) **PICH data-clk (DRPS34)**

PICH data (DRPS35) **PICH TimeSlot Pulse (DRPS36)**

PICH 10ms FramePulse (DRPS37) **P-CCPCH data-clk (DRPS38)**

P-CCPCH data (DRPS39) **DPCH ChipARB FramePulse (DRPS40)**

DPCH TPC-Bit Out (DRPS41) **Mlt-ESG-Sync Trigger-Out (DRPS42)**

Remarks For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:DLINk:RPANel:OUTPut:DOUT

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RPANel:OUTPut:DOUT
DRPS0|DRPS4|DRPS5|DRPS6|DRPS10|DRPS11|DRPS13|DRPS20|DRPS21|DRPS22|
DRPS23|DRPS24|DRPS25|DRPS26|DRPS28|DRPS30|DRPS32|DRPS33|DRPS34|DRPS35|
DRPS36|DRPS37|DRPS38|DRPS39|DRPS40|DRPS41|DRPS42
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RPANel:OUTPut:DOUT?
```

This command assigns a signal to the data output at the selected rear panel AUX I/O connector pin#7. Refer to Table 9-3 on page 1058 for command parameters and output signal names.

***RST** RPS0

Key Entry Refer to **Key Entry** on page 1060.

Remarks For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:DLINk:RPANel:OUTPut:EVENt1

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RPANel:OUTPut:EVENt1
DRPS0|DRPS4|DRPS5|DRPS6|DRPS10|DRPS11|DRPS13|DRPS20|DRPS21|DRPS22|
DRPS23|DRPS24|DRPS25|DRPS26|DRPS28|DRPS30|DRPS32|DRPS33|DRPS34|DRPS35|
DRPS36|DRPS37|DRPS38|DRPS39|DRPS40|DRPS41|DRPS42

[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RPANel:OUTPut:EVENt1?
```

This command assigns a signal to the EVENT 1 rear panel output connector. Refer to Table 9-3 on page 1058 for command parameters and output signal names.

***RST** RPS0

Key Entry Refer to **Key Entry** on page 1060.

Remarks For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:DLINk:RPANel:OUTPut:EVENt2

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RPANel:OUTPut:EVENt2
DRPS0|DRPS4|DRPS5|DRPS6|DRPS10|DRPS11|DRPS13|DRPS20|DRPS21|DRPS22|
DRPS23|DRPS24|DRPS25|DRPS26|DRPS28|DRPS30|DRPS32|DRPS33|DRPS34|DRPS35|
DRPS36|DRPS37|DRPS38|DRPS39|DRPS40|DRPS41|DRPS42
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RPANel:OUTPut:EVENt2?
```

This command assigns a signal to the EVENT 2 rear panel output connector. Refer to Table 9-3 on page 1058 for command parameters and output signal names.

***RST** RPS0

Key Entry Refer to **Key Entry** on page 1060.

Remarks For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:DLINk:RPANel:OUTPut:EVENt3

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RPANel:OUTPut:EVENt3
DRPS0|DRPS4DRPS5|DRPS6|DRPS10|DRPS11|DRPS13|DRPS20|DPRS21|DRPS22|
DRPS23|DRPS24|DRPS25|DRPS26|DRPS28|DRPS30|DRPS32|DRPS33|DRPS34|DRPS35|
DRPS36|DRPS37|DRPS38|DRPS39|DRPS40|DRPS41|DRPS42
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RPANel:OUTPut:EVENt3?
```

This command assigns a signal to the EVENT 3 at the selected rear panel AUX I/O connector pin#19. Refer to Table 9-3 on page 1058 for command parameters and output signal names.

***RST** RPS0

Key Entry Refer to **Key Entry** on page 1060.

Remarks For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:DLINk:RPANel:OUTPut:EVENt4

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RPANel:OUTPut:EVENt4
DRPS0|DPRS4|DRPS5|DRPS6|DRPS10|DRPS11|DRPS13|DRPS20|DRPS21|DRPS22|
DRPS23|DRPS24|DRPS25|DRPS26|DRPS28|DRPS30|DRPS32|DRPS33|DRPS34|DRPS35
DRPS36|DRPS37|DRPS38|DRPS39|DRPS40|DRPS41|DRPS42
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RPANel:OUTPut:EVENt4?
```

This command assigns a signal to the EVENT 4 at the selected rear panel AUX I/O connector pin#18. Refer to Table 9-3 on page 1058 for command parameters and output signal names.

***RST** RPS0

Key Entry Refer to **Key Entry** on page 1060.

Remarks For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:DLINk:RPANel:OUTPut:SSYNc

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RPANel:OUTPut:SSYNc
DRPS0|DRPS4|DRPS5|DRPS6|DRPS10|DRPS11|DRPS13|DRPS20|DRPS21|DRPS22|
DRPS23|DRPS24|DRPS25|DRPS26|DRPS28|DRPS30|DRPS32|DRPS33|DRPS34|DRPS35|
DRPS36|DRPS37|DRPS38|DRPS39|DRPS40|DRPS41|DRPS42
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:RPANel:OUTPut:SSYNc?
```

This command assigns a signal to the SYM SYNC OUT at the selected rear panel AUX I/O connector pin#5. Refer to Table 9-3 on page 1058 for command parameters and output signal names.

***RST** RPS0

Key Entry Refer to **Key Entry** on page 1060.

Remarks For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:DLINk:SCH[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SCH[:STATe] ON|OFF|1|0
```

This command enables or disables the primary and secondary synchronization channel (SSCH).

***RST** 1

Key Entry **Channel State Off On**

Remarks To query the state of the individual channel, refer to ":DLINk:PSCH[:STATe]" on page 1056 and ":DLINk:SSCH[:STATe]" on page 1065.

:DLINk:SCRamblecode

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SCRamblecode <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SCRamblecode?
```

This command selects the scramble code number.

***RST** +0

Range 0–511

Field Entry `Scrambling Code`

:DLINk:SDELay

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SDELay <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SDELay?
```

This command sets the delay of the system frame number (SFN) synchronization when a Multi-ESG-Sync Trigger-In signal is received. The variable `<val>` is expressed in unit of chips.

***RST** +0.00000000E+000

Range 0–38399

Field Entry `Sync Delay`

Remarks This function provides the capability of Inter-Cell Soft Handover test as described in TS.34.121 7.7.1 of the 3GPP standard. The test requires two base stations that generate the same signal but have a 10 chip timing offset. The two base stations are simulated by two ESGs and Sync Delay is the synchronization delay between the ESGs.

:DLINk:SSCH:POWer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SSCH:POWer <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SSCH:POWer?
```

This command sets the power level for the secondary synchronization channel (SSCH). The variable `<val>` is expressed in units of decibels (dB).

***RST** –8.30000000E+000

Range –40 to 0

Field Entry `SSCH Power`

:DLINk:SSCH:SSGRoup

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SSHC:SSGRoup?
```

This command query returns the secondary scramble code group for the secondary synchronization channel (SSCH).

***RST** +0

Field Entry `SSCH 2nd Scramble Group`

:DLINk:SSCH[:STATe]

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:SSCH[:STATe] ON|OFF|1|0`

This command enables or disables the secondary synchronization channel (SSCH).

***RST** 1

Field Entry `SSCH State`

:DLINk:TGAP:FSTRuct

Supported E4438C with Option 400

`[:SOURce]:RADio[1]|2|3|4:WCDMa:TGPP[:BBG]:DLINk:TGAP:FSTRuct A|B`
`[:SOURce]:RADio[1]|2|3|4:WCDMa:TGPP[:BBG]:DLINk:TGAP:FSTRuct?`

This command selects the compressed frame structure for the transmission gaps.

A The pilot field of the last slot in the transmission gap is transmitted and transmission is turned off during the rest of the transmission gap.

B The TPC field of the first slot and the pilot field of the last slot in the transmission gap are transmitted and transmission is turned off during the rest of the transmission gap.

***RST** A

Field Entry `Frame Struct`

:DLINk:TGAP:POFFset

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:POFFset <val>`
`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:POFFset?`

This command specifies the amount of power to be increased when the data is being compressed for the transmission gap power offset.

The variable `<val>` is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range 0–6

Field Entry `PwrOffs`

:DLINk:TGAP:PSI[1]:CFN

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:PSI[1]:CFN <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:PSI[1]:CFN?
```

This command sets the connection frame number (CFN) for the first radio of the first pattern 1.

***RST** 0

Range 1–255

Field Entry `TGCFN`

Remarks The connection frame number (CFN) is counted internally relative to the system sync signal.

:DLINk:TGAP:PSI[1]:CMMethod

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:PSI[1]:CMMehtod SF2|PUNCture
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:PSI[1]:CMMethod?
```

This command selects the compressed mode (CM) method.

SF2 This choice selects a compressed mode method that reduces the spread factor (SF) by 2. This is done by reducing the spreading factor in half. When the dedicated physical data channel's (DPDCH) symbol rate is 960 kbps, the frame is not compressed because it uses the lowest SF value and cannot be reduced.

PUNCture This choice selects a compressed mode method that punctures the convolutional encoder to a lower rate which reduces the number of symbols to be transmitted.

***RST** SF2

Key Entry **SF2** **Puncture**

Remarks To edit the parameters for this command using the ESG front panel keys, highlight the `CM Method` field and select either **SF2** or **Puncture** softkeys.

If the parameter is changed, the apply command must be executed after the change. Refer to ":DLINk:APPLy" on page 1029.

:DLINk:TGAP:PSI[1]:D

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:PSI[1]:D <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:PSI[1]:D?
```

This command sets the transmission gap distance.

***RST** +0

Range 0, 15–269

Field Entry `TGD`

Remarks This command specifies the number of slots between the starting slot of two consecutive transmission gaps within a gap pattern.

:DLINk:TGAP:PSI[1]:L1

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:PSI[1]:L1 3|4|5|7|10|14
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:PSI[1]:L1?
```

This command specifies the length of the first transmission gap (TGL1).

The length is expressed in number of slots.

***RST** 7

Field Entry `TGL1`

:DLINk:TGAP:PSI[1]:L2

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:PSI[1]:L2 3|4|5|7|10|
14|OMITted
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:PSI[1]:L2?
```

This command specifies the length of the second transmission gap (TGL2).

The length is expressed in number of slots.

***RST** OMIT

Field Entry `TGL2`

Key Entry **Omitted**

Remarks When `OMITted` is selected, TGL2 = TGL1.

:DLINk:TGAP:PSI[1]:PL1

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:PSI[1]:PL1 <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:PSI[1]:PL1?
```

This command specifies the duration of the transmission gap pattern length 1 (TGPL1).

The variable `<val>` is expressed in number of frames.

***RST** +2

Range 1–144

Field Entry `TGPL1`

:DLINk:TGAP:PSI[1]:PL2

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:PSI[1]:PL2 <val>|OMITted
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:PSI[1]:PL2?
```

This command specifies the duration of the transmission gap pattern length 2 (TGPL2).

The variable is expressed in number of frames.

***RST** OMIT

Range 1–144

Key Entry **Omitted**

Remarks When `OMITted` is selected, TGPL2 = TGPL1.

:DLINk:TGAP:PSI[1]:PRC

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:PSI[1]:PRC <val>|INFinity
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:PSI[1]:PRC?
```

This command sets the transmission gap pattern repetition count.

***RST** 1

Range 1–511

Key Entry **Infinity**

Field Entry `TGPRC`

Remarks The pattern repetition count (PRC) sets the number of transmission gap patterns within the transmission gap pattern sequence. When `INFinity` is selected, the PRC will continue indefinitely.

:DLINk:TGAP:PSI[1]:PS

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:PSI[1]:PS ACTive|INACtive
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:PSI[1]:PS?
```

This command sets the transmission gap pattern status.

ACTive This choice activates the compressed mode.

INACtive This choice sets the compressed mode to inactive.

***RST** INAC

Key Entry **Active** **Inactive**

:DLINk:TGAP:PSI[1]:SN

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:PSI[1]:SN <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:PSI[1]:SN?
```

This command specifies the timeslot number of the first transmission gap within the first radio frame.

***RST** +11

Range 0–14

Field Entry `TGSN`

:DLINk:TGAP:RPARameter

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:RPARameter DREF11|DREF12|
DREF21|DREF22
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:RPARameter?
```

This command sets the downlink reference compressed mode parameters as defined in 3GPP standard.

DREF11 This choice sets the reference parameter to 1.1.

DREF12 This choice sets the reference parameter to 1.2.

DREF21 This choice sets the reference parameter to 2.1.

DREF22 This choice sets the reference parameter to 2.2.

***RST** CUST

Key Entry **DL Reference 1.1** **DL Reference 1.2** **DL Reference 2.1** **DL Reference 2.2**

Remarks The query returns `CUSTom` when the parameters are set individually.

:DLINk:TGAP:SCFN

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:SCFN <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:SCFN?
```

This command sets the stop connection frame number (CFN) when the stop trigger is used.

When the stop trigger is received at the signal generator, the compressed mode will finish even if the transmission gap pattern repetition count (TGPRC) is still remaining.

***RST** +0

Range 0–255

Field Entry `SCFN`

Remarks The compressed mode stop trigger must be executed for this command to work. Refer to, “:DLINk:TGAP:STOP:TRIGger” on page 1071.

:DLINk:TGAP:STARt:TRIGger

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:STARt:TRIGger
```

This command starts the signal generator compressed pattern transmission. Compressed pattern transmission begins with the specified transmission gap connection frame number (TGCFN).

Key Entry **Compressed Mode Start Trigger**

:DLINk:TGAP:STARt:TRIGger:POLarity

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:STARt:TRIGger:POLarity
POSitive|NEGative
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:STARt:TRIGger:POLarity?
```

This command sets the compressed mode start trigger polarity. The compressed pattern transmission begins when this trigger is received.

POSitive This choice sets the trigger to start when the trigger signal is high.

NEGative This choice sets the trigger to start when the trigger signal is low.

***RST** POS

Key Entry **Comp Mode Start Trigger Polarity Pos Neg**

:DLINk:TGAP:STOP:TRIGger

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:STOP:TRIGger
```

This command stops the signal generator compressed pattern transmission. Compressed pattern transmission begins with the specified transmission gap connection frame number (TGCFN).

Key Entry **Compressed Mode Stop Trigger**

:DLINk:TGAP:STOP:TRIGger:POLarity

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:STOP:TRIGger:POLarity
POSitive|NEGative
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP:STOP:TRIGger:POLarity?
```

This command sets the compressed mode stop trigger polarity. The compressed pattern transmission stops when this trigger is received.

POSitive This choice sets the trigger to stop when the trigger signal is high.

NEGative This choice sets the trigger to stop when the trigger signal is low.

***RST** POS

Key Entry **Comp Mode Stop Trigger Polarity Pos Neg**

:DLINk:TGAP[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP[:STATe] 1|0|ON|OFF
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TGAP[:STATe]?
```

This command enables or disables the transmission gap compressed mode.

***RST** 0

Key Entry **Compressed Mode On Off**

Remarks	When compressed mode is enabled, DPCH2 is automatically disabled and can't be enabled. If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":DLINk:APPLy" on page 1029.

:DLINk:TSETup

Supported	E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TSETup REFSensitiv|MAXinput|ACS|
BLOCking|SPURious|INTermod|PERFreq
```

This command configures the test setup for the downlink channels.

REFSensitivity	This choice selects reference sensitivity. This is the minimum receiver input power measured at the antenna connector.
MAXinput	This choice selects maximum input interference. The receiver is stressed with high-levels of interference from unwanted signals.
ACS	This choice selects adjacent channel selectivity (ACS). This is the receiver ability to receive a wanted signal at the assigned channel frequency with the presence of adjacent signals. ACS is the ratio of the receiver filter attenuation (on the assigned channel) to the receive filter attenuation on the adjacent channel(s).
BLOCking	This choice selects the blocking characteristics. This is a measure of the receiver ability to receive a wanted signal at the assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the adjacent channels.
SPURious	This choice selects spurious emission power. The emissions are generated or amplified by a receiver.
INTermod	This choice selects intermodulation. Third order intermodulation (TIO) or higher mixing of the two interfering RF signals signal in the band of the desired channel.
PERFreq	This choice selects the performance requirement of the dedicated channel. This is a static propagation conditions that is determined by the maximum block error rate (BLER) allowed when the receiver input signal is at a specified Eb/No limit.
Key Entry	**Ref Sensitivity** **Max Input** **ACS** **Blocking** **Spurious Response** **Intermod** **Performance Req**

:DLINk:TXDV

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TXDV NONE|OANT1|OANT2|OATO1|OATO2
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk:TXDV?
```

This command selects the transmit diversity mode of the downlink signal.

NONE	This choice disables the transmit diversity mode.
OANT1	This choice selects a Transmit Diversity Openloop Antenna 1 mode.
OANT2	This choice selects a Transmit Diversity Openloop Antenna 2 mode.
OANTO1	This choice selects a Transmit Diversity Openloop Antenna 1 mode with the SCH TSTD (Synchronization Channel Transmit Switched Time Diversity) off.
OANTO2	This choice selects a Transmit Diversity Openloop Antenna 2 mode with the SCH TSTD (Synchronization Channel Transmit Switched Time Diversity) off.

***RST** NONE

Field Entry `TX Diversity`

Key Entry **None** **OpenLoop Ant1** **OpenLoop Ant2**

OpenLoop Ant1 SCH TSTD OFF **OpenLoop Ant2 SCH TSTD OFF**

:DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:BLKSize

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
BLKSize <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
BLKSize?
```

This command sets the block size (BLKSize) for the selected dedicated transport channel (DCH). The transport channel position affects the behavior of this command as described below.

Transport Channel Mode	Signal Generator Behavior
FLEXible	Changing the block size causes the signal generator to recalculate the block set size. The block size, number of blocks and the block set size values are interdependent as shown in the following formula: block size = block set size ÷ number of blocks
FIXed	There are two signal generator behaviors in this mode: • change the block size to zero, and it remains zero regardless of the block set size and number of blocks values • change the block size to a value other than zero, and the signal generator recalculates the block size as a quotient of the block set size and the number of blocks (block set size ÷ number of blocks), ignoring the value entered by the command

***RST** 20

Range 0–5000

Field Entry `Blk Size`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":DLINk:APPLy" on page 1029.

For information on the number of blocks and block set size commands, see ":DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:NBLocks" on page 1079, and ":DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:BSSize" on page 1075.

Refer to the ":DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:POSition" command on

page 1081 for information on setting the transport channel position.

:DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:BPFRame

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:`
`BPFRame?`

This query returns the number of bits per frame for the selected dedicated transport channel (DCH).

***RST** 60

Field Entry `Bits/Frame`

:DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:BRATe

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:`
`BRATe?`

This query returns the block rate for the selected dedicated transport channel (DCH).

***RST** 20

:DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:BSSize

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
BSSize <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
BSSize?
```

This command sets the block set size (BSSize) for the selected dedicated transport channel (DCH). The transport channel position affects the behavior of this command as described below.

Transport Channel Mode	Signal Generator Behavior
FLEXible	This command has no effect on the block size value. The block size value changes only when there is a value change in the number of blocks or the block size according to the following formula: block set size $\geq$ block size $\times$ number of blocks

Transport Channel Mode	Signal Generator Behavior
FIXed	Changing the block set size value automatically changes the block size, so that the block set size approximates or is the product of the block size and number of blocks values: block set size $\geq$ block size $\times$ number of blocks The change in the block set size value generates a settings conflict error, which the signal generator corrects when it recalculates the block size value.

***RST** 20

Range 0–200000

Field Entry `Blk Set Size`

Remarks Refer to the ":DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:POSition" command on page 1081 for information on setting the transport channel position.

For information on the number of blocks and block size commands, see ":DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:NBLocks" on page 1079, and ":DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:BLKSize" on page 1074.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":DLINk:APPLy" on page 1029.

:DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:CODE

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
CODE HCONv|TCONv|TURBo|NONE
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
CODE?
```

This command selects the encoder type.

HCONv This choice selects coding with the 1/2 rate convolutional encoder.

TCONv This choice selects coding with the 1/3 rate convolutional encoder.

TURBo This choice selects coding with the turbo coder.

NONE This choice selects no coding.

***RST** HCON

Key Entry **1/2 Conv** **1/3 Conv** **Turbo** **None**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:DLINk:APPLy” on page 1029.

:DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:CRC

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
CRC <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
CRC?
```

This command sets the number of cyclic redundancy check (CRC) bits for the dedicated transport channel (DCH).

***RST** 8

Field Entry `CRC Size`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:DLINk:APPLy” on page 1029.

:DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:DATA

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
DATA PN9|FIX4|"<file name>"
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
DATA?
```

This command configures the data for the downlink dedicated transport channel (DCH) selected.

`"<file name>"` This variable specifies a data pattern that has been stored in memory.

***RST** PN9

Key Entry **PN9** **FIX4** **"<User File>"**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:DLINk:APPLy” on page 1029.

:DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:DATA:EINSert

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
DATA:EINSert BLER|BER|NONE
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
DATA:EINSert?
```

This command selects the error insertion mode.

BLER This choice selects a block error rate (BLER) mode.

BER This choice selects a bit error rate (BER) mode.

NONE This choice selects no BLER or BER mode (no error blocks or bit are inserted)

***RST** NONE

Key Entry **BLER** **BER** **None**

:DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:DATA:FIX4

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
DATA:FIX4 <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
DATA:FIX4?
```

This command sets a fixed data type to be transmitted on the selected downlink dedicated transport channel (DCH).

While the variable `<val>` can be entered in binary, hexadecimal, or decimal formats, the query returns only binary values.

***RST** #B0000

Range 0–15

Key Entry **FIX4**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:DLINk:APPLy” on page 1029.

:DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:NBLocks

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
NBLocks <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
NBLocks?
```

This command sets the number of blocks (NBLocks) transmitted by the selected downlink dedicated transport channel (DCH). The transport channel position affects the behavior of this command as described below.

Transport Channel Mode	Signal Generator Behavior
FLEXible	Changing the number of blocks causes the signal generator to recalculate the block set size; *block size* remains constant. The equation is as follows: number of blocks ≤ block set size ÷ block size
FIXed	Changing the number of blocks causes the signal generator to recalculate the block size; *block set size* remains constant. Changing the number of blocks also causes the ESG to generate a settings conflict error that is corrected when the signal generator recalculates the block size. The equation is as follows: number of blocks ≤ block set size ÷ block size

***RST** 1

Range 1–64

Field Entry `# of Blocks`

Remarks Refer to the ":DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:POSition" command on page 1081 for information on setting the transport channel position.

For information on the block size (BLKSize) and block set size (BSSize) commands, see ":DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:BLKSize" on page 1074 and ":DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:BSSize" on page 1075.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to

":DLINk:APPLy" on page 1029.

:DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:POSition

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
POSition FLEXible|FIXed
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
POSition?
```

This command selects a position for the data transmitted by the downlink dedicated transport channel (DCH).

The transport position selection, flexible or fixed, determines how the three block settings, block set size, block size, and number of blocks, for the transport channel are determined.

FLEXible This choice allows the signal generator to automatically set the block set size. The relationship between block set size, block size, and number of blocks is as follows:
block set size = number of blocks × block size

FIXed This choice allows a user-defined block set size. The relationship between block set size, block size, and number of blocks is as follows:
block set size ≥ number of blocks × block size

***RST** FLEX

Key Entry **Transp Position Flexible Fixed**

Remarks For more information on the block parameters, refer to the ":DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:NBLocks" command on page 1081, the ":DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:BSSize" command on page 1075 and the ":DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:BLKSize" command on page 1074.

:DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:PPERcentage

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
PPERcentage?
```

This query returns the percentage of the total bits removed from or added to the fully coded channel.

:DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:RMATch

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
RMATch <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
RMATch?
```

This command sets the rate matching attribute.

***RST** 1

Range 1–256

Field Entry `Rate Match Attr`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":DLINk:APPLy" on page 1029.

:DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6:TTI

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
TTI 10000|20000|40000|80000
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|6:
TTI?
```

This command sets the transmission time interval (TTI) allowed for the dedicated channel (DCH) to transmit.

The choices are expressed in units of milliseconds (msec) where 20000=20 msec.

***RST** 10000

Field Entry `TTI`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":DLINk:APPLy" on page 1029.

:DLINk[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|
6[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:DLINk[:TGRoup[A]|B]:DCH[1]|2|3|4|5|
6[:STATe]?
```

This command enables or disables the selected dedicated transport channel (DCH).

***RST** DCH 1: 1 DCH 2–6: 0

Key Entry **TrCH State Off On**

Remarks DCH1 reset value cannot be turned off. The channels must be turned on sequentially. If one channel is turned off then all higher numbered channels will automatically be turned off.

If the parameter is changed, the apply command must be executed after the change. Refer to ":DLINk:APPLy" on page 1029.

:LINK

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:LINK DOWN|UP
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:LINK?
```

This command sets the uplink or downlink mode.

***RST** DOWN

Key Entry **Link Down Up**

:POLarity[:ALL]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:POLarity[:ALL] NORMal|INVert
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:POLarity[:ALL]?
```

This command selects the polarity for the Q channel.

NORMal This choice selects normal phase polarity.

INVert This choice inverts the internal Q signal.

***RST** NORM

Key Entry **Phase Polarity Normal Invert**

:ULINk:APPLy

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:APPLy
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:APPLy?
```

This command immediately starts the channel coding generation process according to the channel setup and data for the uplink physical and transport channels.

The query returns a response that determines whether or not the execution of the command is necessary. The response from the query is as follows:

1	This response is returned if the execution of the command is required.
0	This response is returned if the execution of the command is not required.
***RST**	+0
Key Entry	**Apply Channel Setup**

:ULINk:AWGN:CN

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:AWGN:CN <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:AWGN:CN?
```

This command sets the in band carrier to noise ratio. The noise is the total noise level of the in-channel.

The variable `<val>` is expressed in units of decibels (dB).

***RST**	–1.80000000E+001
Range	–30 to 30
Field Entry	`C/N value`
Remarks	In compressed mode, carrier power means normal frame power. A change in the C/N value will change the Eb/No value and vice versa.

:ULINk:AWGN:CPOWer

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:AWGN:CPOWer?
```

This query returns the carrier power level when the additive white gaussian noise (AWGN) is on.

The power value is expressed in units of decibels (dBm/3.84 MHz).

***RST** –1.56957537E+002

Field Entry `C Power`

Remarks In compressed mode, carrier power means normal frame power.

:ULINk:AWGN:DRATe

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:AWGN:DRATe?
```

This query returns the data rate of the Eb reference channel.

***RST** +1.22000000E+004

Field Entry `Ref Data Rate`

:ULINk:AWGN:EBNO

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:AWGN:EBNO <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:AWGN:EBNO?
```

This command sets the Eb/No ratio. The Eb is defined as the carrier power divided by the bit rate. No is noise power divided by the bandwidth (3.84MHz).

The variable `<val>` setting is affected by the carrier to noise ratio (C/N) and the data rate. A change to either of these values will affect your Eb/No setting. Use the formula in the range field to determine a correct Eb/No value.

***RST** +6.97971394E+000

Range Eb/No = C/N x 3.84MHz/Data Rate

Field Entry `Eb/No value (dB)`

:ULINk:AWGN:EBRef

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:AWGN:EBRef DPCCh|DPDCh|DCH1|
DCH2|DCH3|DCH4|DCH5|DCH6
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:AWGN:EBRef?
```

This command selects the Eb reference and it is used in the Eb/No value.

DPCCh This choice selects a dedicated physical control channel.

DPDCh This choice selects a dedicated physical data channel.

DCH1 This choice select dedicated transport channel 1.

DCH2 This choice select dedicated transport channel 2.

DCH3 This choice select dedicated transport channel 3.

DCH4 This choice select dedicated transport channel 4.

DCH5 This choice select dedicated transport channel 5.

DCH6 This choice select dedicated transport channel 6.

***RST** DCH1

Key Entry **DPCCH** **DPDCH** **DCH1** **DCH2**

DCH3 **DCH4** **DCH5** **DCH6**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:AWGN:FNBW

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:AWGN:FNBW?
```

This query returns the flat noise bandwidth (BW). Flat noise bandwidth is calculated by BW=(1.6) x (Chip rate) and the result is close to the 0 dB roll-off point.

***RST** +6.14400000E+006

Field Entry `Flat Noise BW`

:ULINk:AWGN:NPOWer

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:AWGN:NPOWer?
```

This query returns the in-channel noise level when the additive white gaussian noise (AWGN) is on.

The power value is expressed in units of decibels (dBm/3.84 MHz).

***RST** –1.38957537E+002

Field Entry `N Power`

:ULINk:AWGN:TICPower

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:AWGN:TICPower?
```

This query returns the total in-channel power (carrier with noise) as defined by the 3GPP standard.

Field Entry `TotalPwr`

Remarks The total in-channel power is a sum of carrier power and in-channel noise power. Changing the noise related parameters such as C/N, Eb/No, and Eb Ref will cause a recalculation of the total in-channel power.

The maximum value returned by this query depends on the power option that is installed in the signal generator.

:ULINk:AWGN[:STATe]

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:AWGN:STATe ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:AWGN:STATe?
```

This command enables or disables the additive white gaussian noise (AWGN). AWGN can only be turned on when DPCCH is selected as the physical channel. Refer to ":ULINk:PHYSical[1]:TYPE" on page 1109.

***RST** 0

Key Entry **Channel State Off On**

Remarks If the parameter is changed, the apply command must be executed after the change. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:CRATe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:CRATe <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:CRATe?
```

This command sets the chip rate for the uplink configuration. The variable `<val>` is expressed in cycles per second (cps).

***RST** +3.84000000E+006

Range 1E3–4.25E6

Field Entry `Chip Rate`

Remarks The chip rate is equivalent to the spreading rate of the channel.

:ULINk:DPCCh:BETA

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:BETA <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:BETA?
```

This command sets the beta value for the uplink dedicated physical control channel (DPCCH). The beta value and the power ratio are coupled. When the power ratio is updated, the beta value is converted to the beta ratio (amplitude ratio).

***RST** +11

Range 0–15

Field Entry `Beta`

Remarks After this command is sent, the channel power level for the DPCCH is re-calculated. If the channel power is set directly, the beta value of this command becomes invalid and is reset to –1.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:ULINk:APPLy” on page 1084.

:ULINk:DPCCh:CCODe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:CCODe <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:CCODe?
```

This command sets the channelization code for the uplink dedicated physical control channel (DPCCH).

***RST** 0

Range 0–255

Field Entry `Channel Code`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:ULINk:APPLy” on page 1084.

:ULINk:DPCCh:DATA

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:DATA PN9|PN15|FIX4|
"<file name>"|STD
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:DATA?
```

This command configures the data pattern for the uplink dedicated physical control channel (DPCCH).

STD This choice sets the DPCCH to use the bits field as defined by the slot format.

`"<file name>"` This variable specifies a data pattern that has been stored in memory.

***RST** STD

Key Entry **PN9** **PN15** **FIX4** **User File** **3GPP STD**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:ULINk:APPLy” on page 1084.

:ULINk:DPCCh:DATA:FIX4

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:DATA:FIX4 <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:DATA:FIX4?
```

This command sets the 4-bit data pattern of the uplink dedicated physical control channel (DPCCH).

While the variable `<val>` can be entered in binary, hexadecimal, or decimal formats, the query returns only binary values.

***RST** #B0000

Range 0–15

Key Entry **FIX4**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:ULINk:APPLy” on page 1084.

:ULINk:DPCCh:FBI:PATTern

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI:PATTern PN9|PN15|FIX|
"<file name>"
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI:PATTern?
```

This command configures the pattern of the feedback information (FBI) for the uplink dedicated physical control channel (DPCCH).

`"<file name>"` This variable specifies a data pattern that has been stored in memory.

***RST** FIX

Key Entry **PN9** **PN15** **FIX** **User File**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:ULINk:APPLy” on page 1084.

:ULINk:DPCCh:FBI:PATTern:FIX

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI:PATTern:FIX <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI:PATTern:FIX?
```

This command sets the 30-bit feedback information (FBI) pattern for the uplink dedicated physical control channel (DPCCH).

While the variable `<val>` can be entered in binary, hexadecimal, or decimal formats, the query returns only decimal values.

***RST** +0

Range 0–10737418235

Key Entry **FIX**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:DPCCh:FBI[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:FBI[:STATe]?
```

This query returns whether or not the feedback information (FBI) bits are included in the uplink dedicated physical control channel (DPCCH). The FBI is included when a status of one is returned. A zero indicates no FBI.

***RST** 0

Range N/A

Field Entry `FBI State`

:ULINk:DPCCh:POWer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:POWer <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:POWer?
```

This command sets the power level for the uplink dedicated physical control channel (DPCCH).

The variable `<val>` is expressed in units of decibels (dB).

***RST** –2.69000000E+000

Range –40 to 0

Field Entry `DPCCH Power`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:DPCCh:RATE

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:RATE?
```

This query returns the symbol rate for the uplink dedicated physical control channel (DPCCH).

***RST** +1.50000000E+004

Field Entry `Symbol Rate`

:ULINk:DPCCh:SLOTformat

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:SLOTformat <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:SLOTformat?
```

This command sets the slot format for the uplink dedicated physical control channel (DPCCH). The variable `<val>` is expressed in unit of bits.

***RST** +0

Range 0–5

Field Entry `Slot Format`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:DPCCh:TFCI:PATTern

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI:PATTern PN9|PN15|FIX|
"<file name>"
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI:PATTern?
```

This command configures the transport format combination indicator (TFCI) bit pattern for the uplink dedicated physical control channel (DPCCH).

`"<file name>"` This variable specifies a data pattern that has been stored in memory.

***RST** FIX

Key Entry **PN9** **PN15** **FIX** **User File**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:DPCCh:TFCI:PATTern:FIX

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI:PATTern:FIX <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI:PATTern:FIX?
```

This command sets the transport format combination indicator (TFCI) 10-bit data pattern for the uplink dedicated physical control channel (DPCCH).

While the variable `<val>` can be entered in binary, hexadecimal, or decimal formats, the query returns only decimal values.

***RST** +0

Range 0–1023

Field Entry `TFCI Pattern`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:DPCCh:TFCI[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TFCI[:STATe]?
```

This query returns the status of the transport format combination indicator (TFCI) for the uplink dedicated physical control channel (DPCCH).

***RST** 1

Range N/A

Field Entry `TFCI State`

:ULINk:DPCCh:TPC:NSTeps

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:NSTeps <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:NSTeps?
```

This command sets the number of steps to increase or decrease the transmit power control (TPC) for the uplink dedicated physical control channel (DPCCH).

The variable `<val>` is expressed in units of decibels (dB).

***RST** +1

Range 1–80

Field Entry `TPC Pat Steps`

Remarks Refer to ":ULINk:DPCCh:TPC:PATTern" on page 1095.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:DPCCh:TPC:PATTern

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern PN9|PN15|FIX4|
"<file name>"|UDOW|DUP|UALL|DALL
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern?
```

This command configures the transmit power control (TPC) pattern for the uplink dedicated physical control channel (DPCCH).

`"<file name>"` This variable specifies a data pattern that has been stored in memory.

UDOW This choice repetitively steps up and down the TPC pattern.

DUP This choice repetitively steps down and up the TPC pattern.

UALL This choice consecutively steps up the TPC pattern.

DALL This choice consecutively steps down the TPC pattern.

***RST** PN9

Key Entry **PN9** **PN15** **FIX4** **"<file name>"** **Up/Down** **Down/Up** **All Up** **All Down**

Remarks Refer to ":ULINk:DPCCh:TPC:NSTeps" on page 1094.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:DPCCh:TPC:PATTern:FIX4

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern:FIX4 <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern:FIX4?
```

This command sets the transmit power control (TPC) 4 bit data pattern for the uplink dedicated physical control channel (DPCCH).

While the variable `<val>` can be entered in binary, hexadecimal, or decimal formats, the query returns only binary values.

***RST** #B0000

Range 0–15

Field Entry `TPC Pattern`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:ULINk:APPLy” on page 1084.

:ULINk:DPCCh:TPC:PATTern:TRIGger:POLarity

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern:TRIGger:
POLarity POSitive|NEGative
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern:TRIGger:
POLarity?
```

This command sets the transmit power control (TPC) pattern trigger polarity for the uplink dedicated physical control channel (DPCCH).

POSitive This choice sets the pattern signal to trigger when the signal is high.

NEGative This choice sets the pattern signal to trigger when the signal is low.

***RST** POS

Key Entry **TPC Pat Trig Polarity Neg Pos**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:ULINk:APPLy” on page 1084.

:ULINk:DPCCh:TPC:PATTern:TRIGger[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern:
TRIGger[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPC:PATTern:
TRIGger[:STATe]?
```

This command enables or disables the transmit power control (TPC) pattern trigger state for the uplink dedicated physical control channel (DPCCH).

***RST** 0

Field Entry `TPC UserFile Trig`

Remarks The TPC pattern trigger input is located on the AUX I/O connector (ALT PWR IN, pin#16). For more information about the rear panel AUX I/O connector, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*. If the parameter is changed, the apply command must be executed after the change. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:DPCCh:TPOWer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh:TPOWer?
```

This query returns the "Total Power" value displayed on the user interface (UI). The power value is the relative power difference between the total in-channel signal power and the active channel reference power (0dB).

***RST** +0.00000000E+000

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:DPCCh[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPCCh[:STATe]?
```

This command enables or disables the operating state for the uplink dedicated physical control channel (DPCCH).

***RST** 1

Field Entry `Channel State`

Remarks If the parameter is changed, the apply command must be executed after the change. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:DPDCh:BETA

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:BETA <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:BETA?
```

This command sets the beta value for uplink dedicated physical data channel (DPDCH).

***RST** +15

Range 0–15

Field Entry `Beta`

Remarks The beta value and power ratio are coupled. After this command is sent, the value of the channel power level of the DPDCH is re-calculated.

If the channel power is set directly, the value of this command becomes invalid and is set to –1.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:DPDCh:CCODe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:CCODe <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:CCODe?
```

This command sets the channelization code for the uplink dedicated physical data channel (DPDCH). There are commands that are associated with the channelization code and they are the slot format and the symbol rate.

If the slot format is changed, so will the symbol rate. If the symbol rate is changed, so will the slot format. In addition, the channelization code will change. If current channelization code exceed the new maximum value for the specified slot format or symbol rate, a setting conflict error is generated and the value is clipped to the maximum value. Refer to Table 9-4 on page 1099.

Table 9-4 Channelization Code Maximum Value

Channelization Code	Slot Format	Symbol Rate
255	0	15
127	1	30
63	2	60
31	3	120
15	4	240
7	5	780
3	6	960

***RST** +16

Range 0–255

Field Entry `Channel Code`

Remarks Refer to ":ULINk:DPDCh:SLOTformat" on page 1103 and ":ULINk:DPDCh:RATE" on page 1101. If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:DPDCh:DATA

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:DATA PN9|PN15|FIX4|
"<file name>"|TRANspch
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:DATA?
```

This command configures the data pattern of the uplink dedicated physical data channel (DPDCH).

TRANspch This choice sets the data that is generated from the transport channel setup.

"<file name>" This variable specifies a data pattern that has been stored in memory.

***RST** TRAN

Key Entry **PN9** **PN15** **FIX4** **User File** **Transport CH**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:DPDCh:DATA:FIX4

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:DATA:FIX4 <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:DATA:FIX4?
```

This command sets the fixed 4-bit binary data for the uplink dedicated physical data channel (DPDCH).

While the variable `<val>` can be entered in binary, hexadecimal, or decimal formats, the query returns only binary values.

***RST** #B0000

Range 0–15

Field Entry `Data`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:DPDCh:POWer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:POWer <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:POWer?
```

This command sets the power level for the uplink dedicated physical data channel (DPDCH).

The variable `<val>` is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –40 to 0

Field Entry `DPDCH Power`

Remarks The power ratio and the beta value are coupled. After the beta value is specified and sent, the value of the channel power level of the DPDCH is re-calculated.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:DPDCh:RATE

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:RATE <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:RATE?
```

This command sets the symbol rate for the uplink dedicated physical data channel (DPDCH). There are commands that are associated with the symbol rate and they are the channelization code and the slot format.

If the slot format is changed, so will the symbol rate. If the symbol rate is changed, so will the slot format. In addition, the channelization code will change. If current channelization code exceed the new maximum value for the specified slot format or symbol rate, a setting conflict error is generated and the value is clipped to the maximum value. Refer to Table 9-5.

Table 9-5 Channelization Code Maximum Value

Channelization Code	Slot Format	Symbol Rate
255	0	15
127	1	30

Table 9-5 Channelization Code Maximum Value

Channelization Code	Slot Format	Symbol Rate
63	2	60
31	3	120
15	4	240
7	5	780
3	6	960

The variable `<val>` is expressed in units of kilo symbols per second (ksps).

***RST** +6.00000000E+004

Range 15000–960000

Field Entry `Symbol Rate`

Remarks Refer to “:ULINk:DPDCh:CCODe” on page 1099 and “:ULINk:DPDCh:RATE” on page 1101. If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:ULINk:APPLy” on page 1084.

:ULINk:DPDCh:RBER

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:RBER?
```

This query returns inserted error bit rate which is specified by the transport channel cycle length and transport channel error length commands.

Inserted error bit rate is calculated by the following formula: `TrCH BER ErrLen/TrCH BER Cycle`. Refer to “:ULINk:DPDCh:TBER[:CLENgth]” on page 1104 and “:ULINk:DPDCh:TBER:ELENgth” on page 1104.

***RST** 0.0

Field Entry `TrCH BER`

:ULINk:DPDCh:SLOTformat

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:SLOTformat <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:SLOTformat?
```

This command sets the slot format for the uplink dedicated physical data channel (DPDCH).

There are commands that are associated with the slot format and they are the channelization code and the symbol rate.

If the slot format is changed, so will the symbol rate. If the symbol rate is changed, so will the slot format. In addition, the channelization code will change. If current channelization code exceed the new maximum value for the specified slot format or symbol rate, a setting conflict error is generated and the value is clipped to the maximum value. Refer to Table 9-6 on page 1103.

Table 9-6 Channelization Code Maximum Value

Channelization Code	Slot Format	Symbol Rate
255	0	15
127	1	30
63	2	60
31	3	120
15	4	240
7	5	780
3	6	960

***RST** +2

Range 0–6

Field Entry `Slot Format`

Remarks Refer to ":ULINk:DPDCh:CCODe" on page 1099 and ":ULINk:DPDCh:RATE" on page 1101. If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:DPDCh:TBER[:CLENgth]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:TBER[:CLENgth] <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:TBER[:CLENgth]?
```

This command sets the cycle length of the Transport Channel BER insertion of dedicated physical channel (DPCH).

***RST** 0

Range 0–65535

Field Entry `TrCH BER Cycle`

Remarks A zero in the `TrCH BER Cycle` field, disables the error insertion function (error rate equals 0%).

:ULINk:DPDCh:TBER:ELENgth

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:TBER:ELENgth <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:TBER:ELENgth?
```

This command sets the error length of the Transport Channel BER.

***RST** 0

Range 0–4095

Field Entry `TrCH BER ErrLen`

Remarks The Transport Channel BER error length must be smaller than or equal to the Transport Channel BER cycle length.

The TrCH ELEN (transport channel error length) is truncated by the TrCH CLEN (transport channel cycle length) when the TrCH BER cycle length is smaller than TrCH BER length.

:ULINk:DPDCh:TPOWer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh:TPOWer?
```

This query returns the "Total Power" value displayed on the user interface (UI). The power value is the relative power difference between the total in-channel signal power and the active channel reference power (0dB).

***RST** +0

:ULINk:DPDCh[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:DPDCh[:STATe]?
```

This command enables or disables the operating state for the uplink dedicated physical data channel (DPDCH).

***RST** 1

Field Entry `Channel State`

Remarks If the parameter is changed, the apply command must be executed after the change. Refer to":ULINk:APPLy" on page 1084.

:ULINk:FCLock:INTerval

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FCLock:INTerval FCL10|FCL20|
FCL40|FCL80|FCL2560
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FCLock:INTerval?
```

This command selects the frame clock interval supplied to the source.

The frame clock interval is set in units of milliseconds (msec).

***RST** FCL80

Key Entry **10 msec** **20 msec** **40 msec** **80 msec** **2560 msec**

Remarks This command is not used when the sync source is set to ESG. Refer to ":ULINk:SYNC[:SOURce]" on page 1161.

:ULINk:FCLock:POLarity

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FCLock:POLarity POSitive|NEGative
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FCLock:POLarity?
```

This command sets the polarity of the frame clock for the uplink synchronization source.

POSitive	This choice sets the clock gate to trigger when the signal is high.
NEGative	This choice sets the clock gate to trigger when the signal is low.
***RST**	POS
Key Entry	**Frame Clock Polarity Neg Pos**
Remarks	This command is not used when the sync source is set to ESG. Refer to ":ULINk:SYNC[:SOURce]" on page 1161.

:ULINk:FILTer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer RNYQuist|NUQuist|GAUSsian|
RECTangle|IS95|IS95_EQ|IS95_MOD|IS95_MOD_EQ|AC4Fm| UGGaussian|
"<user FIR>"
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer?
```

This command selects the filter type for the uplink configuration.

IS95	This choice selects a filter that meets the criteria of the IS-95 standard.
IS95_EQ	This choice selects a filter which is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard. This filter is only used for IS-95 baseband filtering.
IS95_MOD	This choice selects a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.
IS95_MOD_EQ	This choice selects a filter which is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance), with lower passband rejection.
AC4Fm	This choice selects a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.

UGGaussian	This choice selects a backwards compatible GSM Gaussian filter (Gaussian filter with a fixed BbT value of 0.300) for the ESG E44xxB Option UN3 or UN4.
`"<user FIR>"`	This variable is any filter file that you have stored into memory.
***RST**	RNYQ
Key Entry	**Root Nyquist** **Nyquist** **Gaussian** **Rectangle** **IS-95** **IS-95 w/EQ** **IS-95 Mod** **IS-95 Mod w/EQ** **APCO 25 C4FM** **UN3/4 GSM Gaussian** User FIR
Remarks	Refer to "File Name Variables" on page 13 for information on the file name syntax.

:ULINk:FILTer:ALPHa

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer:ALPHa <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer:ALPHa?
```

This command changes the alpha value for the Nyquist or root Nyquist filter.

***RST**	+2.20000000E–001
Range	0.000–1.000
Key Entry	**Filter Alpha**
Remarks	This command is effective only after a root Nyquist or Nyquist filter is selected; it does not affect other types of filters.
	To change the current filter type, refer to ":ULINk:FILTer" on page 1106.

:ULINk:FILTer:BBT

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer:BBT <value>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer:BBT?
```

This command changes the bandwidth-multiplied-by-bit-time filter parameter value for the Gaussian filter.

***RST** +5.00000000E–001

Range **0.000–1.000**

Key Entry **Filter BbT**

Remarks This command is effective only after a Gaussian filter is selected; it does not affect other types of filters.

To change the current filter type, refer to “:ULINk:FILTer” on page 1106.

:ULINk:FILTer:CHANnel

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer:CHANnel EVM|ACP
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FILTer:CHANnel?
```

This command optimizes a filter for minimized error vector magnitude (EVM) or for minimized adjacent channel power (ACP).

EVM This choice provides the most ideal passband.

ACP This choice improves stopband rejection. This feature only applies to root Nyquist and Nyquist filters.

***RST** EVM

Key Entry **Optimize FIR For EVM ACP**

Remarks To change the current filter type, refer to “:ULINk:FILTer” on page 1106.

:ULINk:FOFFset

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FOFFset <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:FOFFset?
```

This command sets the SFN-CFN frame number offset. The command adds in delays of the internal frame counter by specifying the starting frame number count.

When the FOFFset is set to “0,” the frame number starts at the system sync trigger.

An example of specifying a frame number count: Set the FOFFset to 2. This makes the signal generator to trigger 2 frames after the SFN RST.

***RST** 0

Range **0–255**

Key Entry **SFN-CFN Frame Offset**

Remarks For additional information, refer to 3GPP TS25.402 for SFN and CFN relationship.

:ULINk:PADJust

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PADJust EQUal|SCALe
```

This command adjusts the code domain power levels of all uplink channels.

EQUal This choice will adjust all channel powers to equal power settings.

SCALe This choice will scale the channel power levels so that the sum of the powers are equal to 0 dB.

Key Entry **Equal Powers** **Scale To 0dB**

:ULINk:PHYSical[1]:TYPE

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PHYSical[1]:TYPE PRACh|DPCCh
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PHYSical[1]:TYPE?
```

This command sets the physical channel type.

PRACh This choice selects a physical random access channel type.

DPCCh — This choice selects a dedicated physical control channel type.

***RST** DPCC

Key Entry **PRACH** **DPCCH**

:ULINk:PMODe:TPControl:HOLD

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PMODe:TPControl:HOLD 1|0|ON|OFF
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PMODe:TPControl:HOLD?
```

This command sets the transmission power control of the dedicated physical channel (DPCH).

ON — This choice enables the power hold mode.

OFF — This choice disables the power hold mode and enables the dynamic power control

***RST** 1

Key Entry **Power Hold** **Off** **On**

Remarks The power hold mode is automatically enabled when the dedicated physical channel (DPCH) **Power Mode Norm TPC** is set to **TPC** (refer to ":ULINk:PMODe[:SELect]" on page 1113).

:ULINk:PMODe:TPControl:POWer:INITial

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PMODe:TPControl:POWer:
INITial <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PMODe:TPControl:POWer:INITial?
```

This command sets the initial power (in dB; relative to `Max Power: 0.00 dB`) of the DPCH power control.

***RST** +0.00000000E+000

Range 0 to –40

Field Entry `Init Power`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

The value of `<val>` must be smaller or equal to the value use for the command: ":ULINk:PMODe:TPControl:POWer:MINimum" on page 1111. `Init Power` is relative to `Max Power` (the amplitude set on the signal generator). For more information refer to ":ULINk:PMODe:TPControl:POWer:MAXimum" on page 1111.

:ULINk:PMODe:TPControl:POWer:MAXimum

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PMODe:TPControl:POWer:MAXimum?
```

This query returns the maximum power (in dB; relative to `Max Power`) of the dedicated physical channel (DPCH).

`Max Power` is a grayed out field that will always be 0.00 dB. The value of this field is a relative value to the maximum amplitude set for the signal generator. For example, if the signal generator amplitude is set to -20 dBm, the `Min Power` set to -40 dB, and the `Init Power` is set to -10 dB, then the absolute initial power level will be -30 dBm (10 dBm below the signal generator amplitude) and the absolute minimum power will be -60 dBm (40 dBm below the signal generator amplitude).

***RST** +0.00000000E+000

Field Entry `Max Power`

Remarks The value of this query will always be zero. The maximum power is mapped to the actual RF output power.

:ULINk:PMODe:TPControl:POWer:MINimum

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PMODe:TPControl:POWer:
MINimum <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PMODe:TPControl:POWer:MINimum?
```

This command sets the minimum power of the dedicated physical channel (DPCH). The variable `<val>` is expressed in units of dB.

***RST** -4.00000000E+001

Range –40 to 0

Field Entry `Min Power`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:ULINk:APPLy” on page 1084.

The minimum power is decreased in increments determined by the value set for the Power Step. Refer to “:ULINk:PMODe:TPControl:POWer:STEP” on page 1112. Minimum power is limited by the amplitude set on the signal generator. The signal generator amplitude must be set to -96 dBm or lower for the minimum power to be set to -40 dB. For more information, refer to “:ULINk:PMODe:TPControl:POWer:MAXimum” on page 1111.

:ULINk:PMODe:TPControl:POWer:RESet

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PMODe:TPControl:POWer:RESet
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PMODe:TPControl:POWer:MINimum?
```

This command resets the transmit power of the dedicated physical channel (DPCH) to the initial power.

Key Entry **Reset to Initial Power**

Remarks When the DPCH power mode is changed to TPControl, this command is performed. Refer to “:ULINk:PMODe[:SELect]” on page 1113 to select the power mode. Any time the power mode is changed, the start power is always set to the initial power.

:ULINk:PMODe:TPControl:POWer:STEP

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PMODe:TPControl:POWer:
STEP DB0_5|DB1_0|DB2_0|DB3_0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PMODe:TPControl:POWer:STEP?
```

This command set the power step of the dedicated physical channel (DPCH) power control. Initial power can only be increased in steps set by the power step.

***RST** DB0_5

Key Entry `Power Step`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:ULINk:APPLy” on page 1084.

:ULINk:PMODe:TPControl:TRIGger:POLarity

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PMODe:TPControl:TRIGger:
POLarity POSitive|NEGative
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PMODe:TPControl:TRIGger:POLarity?
```

This command sets the uplink dedicated physical channel (DCPH) transmit power control signal polarity.

***RST** POS

Key Entry **Power Control Signal Polarity Neg Pos**

:ULINk:PMODe[:SELect]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PMODe[:SELect] NORMal|TPControl
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PMODe[:SELect]?
```

This command sets the dedicated physical channel (DPCH) power control mode.

NORMal This choice selects the normal power mode. Compressed frames are available.

TPC This choice selects the TPC power mode. Compressed gaps are not available.

***RST** NORM

Key Entry **Power Mode** **Norm** **TPC**

:ULINk:PRACh:AICH:NUMBer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:AICH:NUMBer?
```

This query returns the number of received acquisition indication channel (AICH) trigger during one configured physical random access channel (PRACH) signal generation.

The result value can be queried after the PRACH signal generation is completed and until the next PRACH generation trigger is received.

The signal begins when the PRACH start trigger and ends when the specified number of signals are generated.

To specify a number of PRACHs, refer to ":ULINk:PRACh[:SINGle]:PREamble:NUMBer" on page 1143.

***RST** –1

Field Entry `Number of AICH`

Remarks A –1 status represents a PRACH generation is on going.

:ULINk:PRACh:AICH:POLarity

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:AICH:
POLarity POSition|NEGative
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:AICH:POLarity?
```

This command sets the trigger signal polarity for the acquisition indication channel (AICH).

POSitive This choice sets the signal polarity to trigger when the signal goes high.

NEGative This choice sets the signal polarity to trigger when the signal goes low.

***RST** POS

Key Entry **AICH Trigger Polarity Pos Neg**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084

:ULINk:PRACh:AWGN:CN

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:AWGN:CN <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:AWGN:CN?
```

This command sets the in band carrier to noise ratio.

The variable `<val>` is expressed in units of decibels (dB).

***RST** –2.25005194E+001

Range –30 to 30

Field Entry `C/N value`

Remarks A change in the C/N value will change the Eb/No value and vice versa.

:ULINk:PRACh:AWGN:CPOWer

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:AWGN:CPOWer?
```

This query returns the carrier power level when the physical random access channel's (PRACH) additive white gaussian noise (AWGN) is on.

***RST** –1.61435521E+002

Field Entry `C Power`

:ULINk:PRACh:AWGN:DRATe

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:AWGN:DRATe?
```

This query returns the data rate of the Eb reference channel.

***RST** +1.22000000E+004

Field Entry `Ref Data Rate`

:ULINk:PRACh:AWGN:EBNO

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:AWGN:EBNO <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:AWGN:EBNO?
```

This command sets the Eb/No value. The Eb is defined as carrier divided by the bit rate. No is noise power divided by the bandwidth (3.84 MHz). This ratio is only referred when EREF is CONTrol or DATA.

The variable `<val>` setting is affected by the carrier to noise ratio (C/N) and the data rate. A change to either of these values will affect your Eb/No setting. Use the formula in the range field to determine a correct Eb/No value.

***RST** +4.10000000E+000

Range Eb/No = C/N x 3.84MHz/DataRate

Field Entry `Eb/No`

:ULINk:PRACh:AWGN:ECNO

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:AWGN:ECNO <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:AWGN:ECNO?
```

This command sets the Ec/No value. The Ec is defined as carrier divided by the chip rate. No is the noise power divided by the bandwidth (3.84 MHz). This ratio is only referred when EREF is PREamble.

***RST** –2.05000000E+001

Range –30 to 30

Field Entry `Ec/No value`

:ULINk:PRACh:AWGN:EREF

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:AWGN:EREF PREamble|
CONTrol|DATA|RACH
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:AWGN:EREF?
```

This command selects the Eb (Ec) reference. It is used for specifying the bit (chip) rate of physical/transport channel.

PREamble	This choice selects a preamble part as the Ec/No reference.
CONTrol	This choice selects a message control part as the Eb/No reference.
DATA	This choice selects a message data part as the Eb/No reference.
RACH	This choice selects a random access channel as the Eb/No reference.

***RST** RACH

Key Entry **Preamble** Msg Ctrl Msg Data **RACH TrCH**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh:AWGN:NPOWer

Supported E4438C with Option 400 and 403

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:AWGN:NPOWer?`

This query returns the in-channel noise level when the additive white gaussian noise (AWGN) is on.

***RST** –1.38935002E+002

Field Entry `N Power`

:ULINk:PRACh:AWGN:TICPower

Supported E4438C with Option 400 and 403

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:AWGN:TICPower?`

This query returns the in-channel power within the 3.84 MHz bandwidth.

***RST** **DPCH:** –1.38924800E+002

Single PRACH: –1.38924800E+002

Multiple PRACH: -1.56970651E+002

Field Entry `TotalPwr`

:ULINk:PRACh:AWGN[:STATe]

Supported E4438C with Option 400 and 403

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:AWGN[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:AWGN[:STATe]?
```

This command enables or disables the additive white gaussian noise (AWGN) for the physical random access channel (PRACH). The AWGN can only be turned on when PRACH is selected as the physical channel.

***RST** 0

Key Entry **Channel State Off On**

Remarks Refer to “:ULINk:PHYSical[1]:TYPE” on page 1109.

If the parameter is changed, the apply command must be executed after the change. Refer to “:ULINk:APPLy” on page 1084.

:ULINk:PRACh:MESSage:CPARt:BETA

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:CPARt:BETA <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:CPARt:BETA?
```

This command sets the beta ratio (amplitude ratio) for the physical random access channel (PRACH) message control part. The variable `<val>` is an integer value.

Changing the control power value (see ":ULINk:PRACh:MESSage:CPARt:POWer" on page 1119 for information on setting PRACH control power) changes the beta to power ratio, and the ESG may not be able to compute a proper control beta value. If this occurs, the query will return a minus one (-1).

***RST** +11

Range 0–15

Field Entry `Ctrl Beta`

Remarks A change to the beta value will also cause a change to the control power setting.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh:MESSage:CPARt:DATA

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:CPARt:DATA PN9|
PN15|FIX4|"<file name>"|STD
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:CPARt:DATA?
```

This command selects the data type to be inserted into the physical random access channel (PRACH) message control part.

STD This choice selects a slot format defined in the 3GPP standard.

`"<file name>"` This variable specifies a data pattern that has been stored in memory.

***RST** STD

Key Entry **PN9** **PN15** **FIX4** **User File** **3GPP STD**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh:MESSage:CPARt:DATA:FIX4

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:CPARt:DATA:
FIX4 <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:CPARt:DATA:FIX4?
```

This command sets a fixed 4 bit pattern for use as physical random access channel (PRACH) message part data.

While the variable `<val>` can be entered in binary, hexadecimal, or decimal formats, the query returns only binary values.

***RST** #B0000

Range 0–15

Key Entry **Fix4**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh:MESSage:CPARt:POWer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:CPARt:POWer <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:CPARt:POWer?
```

This command sets the power level for the physical random access channel (PRACH) message control part.

The variable `<val>` is expressed in units of decibels (dB).

***RST** –2.69000000E+000

Range –40 to 0

Field Entry `Ctrl Pwr`

Remarks Changing the control power changes the beta to power ratio. Refer to ":ULINk:PRACh:MESSage:CPARt:BETA" on page 1118 for more information.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084

:ULINk:PRACh:MESSage:CPARt:RATE

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:CPARt:RATE?
```

This query returns the message data part symbol rate for the physical random access channel (PRACH).

***RST** +1.50000000E+004

Key Entry **Symbol Rate**

Remarks The symbol rate of 15 kbps is the only supported rate per the 3GPP standards, TS 25.211 v3.10 (2002-03).

:ULINk:PRACh:MESSage:CPARt:SLOTformat

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:CPARt:SLOTformat?
```

This query returns the message control part slot format for the physical random access channel (PRACH).

***RST** 0

Range 0–3

Field Entry `Slot Format`

Remarks The slot format is a static value set to zero in accordance with the 3GPP standards, TS 25.211 v3.10 (2002-03).

:ULINk:PRACh:MESSage:CPARt:TFCI:PATTern

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:CPARt:TFCI:
PATTern PN9|PN15|FIX|"<file name>"
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:CPARt:TFCI:PATTern?
```

This command selects data type to be inserted into the transport format combination indicator (TFCI) of the message control part located in the physical random access channel (PRACH).

`"<file name>"` This variable specifies a data pattern that has been stored in memory.

***RST** FIX

Key Entry **PN9** **PN15** **FIX** **User File**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh:MESSage:CPARt:TFCI:PATTern:FIX

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:CPARt:TFCI:PATTern:
FIX <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:CPARt:TFCI:PATTern:
FIX?
```

This command sets a fixed bit pattern to be inserted into the transport format combination indicator (TFCI).

While the variable `<val>` can be entered in binary, hexadecimal, or decimal formats, the query returns only decimal values.

***RST** +0

Range 0–1023

Field Entry `TFCI Pattern`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh:MESSage:CPARt:TFCI[:STATe]

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:CPARt:TFCI[:STATe]?`

This query returns the transport format combination indicator (TFCI) bits to determine if they exist or not in the currently specified slot format. A query returned with a “1” determines a TFCI exists and a “0,” no bits exist.

***RST** 1

Field Entry `TFCI State`

:ULINk:PRACh:MESSage:DPARt:BETA

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:DPARt:BETA <val>`

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:DPARt:BETA?`

This command sets the beta ratio (amplitude ratio) for the message data part of the physical random access channel (PRACH).

The variable `<val>` is an integer value. Changing the data power value (refer to, “:ULINk:PRACh:MESSage:DPARt:POWer” on page 1124 for more information on setting PRACH data power) changes the beta to power ratio, and the signal generator may not be able to compute a proper data beta value. If this occurs, the query will return a minus one (-1).

***RST** +15

Range 0–15

Field Entry `Data Beta`

Remarks A change to the beta value will also cause a change to the data power setting.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:ULINk:APPLy” on page 1084.

:ULINk:PRACh:MESSage:DPARt:DATA

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:DPARt:DATA PN9|
PN15|FIX4|"<file name>"|TRANspch
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:DPARt:DATA?
```

This command sets the data type to be inserted into physical random access channel (PRACH) message data part.

TRANspch This choice sets the data that is generated from the transport channel setup.

`"<file name>"` This variable specifies a data pattern that has been stored in memory.

***RST** TRAN

Key Entry **PN9** **PN15** **FIX4** **User File** **Transport CH**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh:MESSage:DPARt:DATA:FIX4

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:DPARt:DATA:
FIX4 <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:DPARt:DATA:FIX4?
```

This command sets a pseudo-random pattern as output data type in the message data part of the physical random access channel (PRACH).

While the variable `<val>` is expressed in binary or decimal formats, the query returns only binary values.

***RST** #B0000

Range 0∠15

Key Entry **FIX4**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh:MESSage:DPARt:POWer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:DPARt:POWer <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:DPARt:POWer?
```

This command sets the power level for the physical random access channel (PRACH) message data part.

The variable `<val>` is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –40 to 0

Field Entry `Data Pwr`

Remarks Changing the data power changes the beta to power ratio. Refer to ":ULINk:PRACh:MESSage:DPARt:BETA" on page 1122 for more information.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084

:ULINk:PRACh:MESSage:DPARt:RATE

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:DPARt:RATE <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:DPARt:RATE?
```

This command sets the symbol rate for the message data part of the physical random access channel (PRACH).

There are commands that are associated with the symbol rate and they are the channelization code and the slot format.

If the slot format is changed, so will the symbol rate. If the symbol rate is changed, so will the slot format. In addition, the channelization code will change. If current channelization code exceed the new maximum value for the specified slot format or symbol rate, a setting conflict error is generated and the value is clipped to the maximum value. Refer to Table 9-7.

Table 9-7 Channelization Code Maximum Value

Channelization Code	Slot Format	Symbol Rate
255	0	15
127	1	30
63	2	60
31	3	120

The variable `<val>` is expressed in units of kilo symbols per second (ksps).

***RST** 60

Range 15–120

Field Entry `Symbol Rate`

Remarks Channel code value is determined by slot format choice. Refer to ":ULINk:PRACh:MESSage:DPARt:SLOTformat" on page 1125 and ":ULINk:PRACh[:SINGle]:MESSage:DPARt:CCODe" on page 1141.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh:MESSage:DPARt:SLOTformat

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:DPARt:
SLOTformat <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MESSage:DPARt:SLOTformat?
```

This command sets the slot format value for the message data part of the physical random access channel (PRACH).

There are commands that are associated with the slot format and they are the channelization code and the symbol rate.

If the slot format is changed, so will the symbol rate. If the symbol rate is changed, so will the slot format. In addition, the channelization code will change. If current channelization code exceed the new maximum value for the specified slot format or symbol rate, a setting conflict error is generated and the value is clipped to the maximum value. Refer to Table 9-8.

Table 9-8 Channelization Code Maximum Value

Channelization Code	**Slot Format**	**Symbol Rate**
255	0	15
127	1	30
63	2	60
31	3	120

The variable `<val>` is expressed in units of kilo symbols per second (ksps).

***RST** 2

Range 0–3

Field Entry `Slot Format`

Remarks Refer to ":ULINk:PRACh:MESSage:DPARt:RATE" on page 1124 and ":ULINk:PRACh[:SINGle]:MESSage:DPARt:CCODe" on page 1141.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh:MODE[:SELect]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MODE[:SELect] SINGle|MULTi
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MODE[:SELect]?
```

This command sets the channel mode of the physical random access channel (PRACH).

SINGle This choice generates a single PRACH.

MULTi This choice generates up to eight PRACHes.

***RST** SING

Key Entry **PRACH Mode** **Single** **Mult i**

:ULINk:PRACh:MULTi:MESSage:TPOWer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MULTi:MESSage:TPOWer <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MULTi:MESSage:TPOWer?
```

This command sets the message total power value in the physical random access channel (PRACH). The total power indicates a power of one PRACH.

***RST** –1.54060000E+002

Range –1.00 to 1.94

Field Entry `Msg Pwr`

Remarks This value is used only when POWer:MODE is set to TOTal. Refer to ":ULINk:PRACh:PREamble:POWer:MODE" on page 1133.

The maximum power for this command is limited by the power of the signal generator (ESG maximum power – 18.06 dBm). If the signal generator power is set to +20 dBm, the maximum value of this command is +1.94 dBm.

:ULINk:PRACh:MULTi:MESSage[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MULTi:MESSage[:STATe]
ON|OFF
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MULTi:MESSage[:STATe]?
```

This command enables or disables the message part of the physical random access channel (PRACH) for the multiple PRACH mode.

***RST** ON

Field Entry `Message Part`

:ULINk:PRACh:MULTi:NUMBer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MULTi:NUMBer <val>|INFinity
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MULTi:NUMBer?
```

This command specifies the number of the physical random access channel (PRACH) 80 ms configuration patterns to be transmitted after the PRACH start trigger has been received.

INFinity	This choice means the repeating number will continue while the PRACH mode is selected and the start trigger is ignored.
***RST**	1
Range	1–2147447836
Field Entry	`Number of 80ms`
Remarks	If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh:MULTi:PREamble:NUMBer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MULTi:PREamble:NUMBer?
```

This query returns the number of Preambles on the multiple physical random access channel (PRACH) mode. This number is fixed to 1 in the current version.

***RST**	1
Field Entry	`Num of Pre`

:ULINk:PRACh:MULTi:PREamble:POWer:INITial

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MULTi:PREamble:POWer:
INITial?
```

This query returns the initial power of PRACH preambles on the multiple physical random access channel (PRACH) mode.

***RST**	–1.54060000E+002
Range	–154.06 to 10
Field Entry	`Init Pwr`
Remarks	For the multiple PRACH mode, the initial power is the same as the maximum power for the PRACH preamble.

:ULINk:PRACh:MULTi:PREamble:POWer:MAX

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MULTi:PREamble:POWer
:Max<val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MULTi:PREamble:POWer:
Max?
```

This command sets the power of the preamble on the multiple physical random access channel (PRACH) mode.

***RST** –1.54060000E+002

Range –1.0 to 1.94

Field Entry `Max Pwr`

Remarks The maximum power for this command is limited by the power of the signal generator (ESG maximum power – 18.06 dBm). If the signal generator power is set to +20 dBm, the maximum value of this command is +1.94 dBm.

:ULINk:PRACh:MULTi:PREamble:POWer:RSTep

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MULTi:PREamble:POWer:RSTep?
```

This query, for the multiple physical random access channel (PRACH) mode, always returns zero, because power ramping is not supported for the multiple PRACH mode.

***RST** +0

Field Entry `Ramp Step`

:ULINk:PRACh:MULTi:PREamble:PPM

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MULTi:PREamble:PPM <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MULTi:PREamble:PPM?
```

This command sets the difference between the preamble and the message control part in the physical random access channel (PRACH).

***RST** -4.56000000E+000

Range –20 to 10

Field Entry `Pp-m`

:ULINk:PRACh:MULTi:UE[1]|2|3|4|5|6|7|8:MESSage:CPARt:CCODe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MULTi:UE[1]|2|3|4|5|6|7|8:
MESSage:CPARt:CCODe?
```

This query returns the channel code of the message control part of physical random access channel (PRACH) on the multiple PRACH mode.

***RST** 255

Range 0–255

Field Entry `CHCode Ctl`

Remarks This command affects the PRACH setting on the multiple PRACH mode only.

:ULINk:PRACh:MULTi:UE[1]|2|3|4|5|6|7|8:MESSage:DPARt:CCODe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MULTi:UE[1]|2|3|4|5|6|7|8:
MESSage:DPARt:CCODe?
```

This query returns the channel code of the message data part of physical random access channel (PRACH) on the multiple PRACH mode.

***RST** 245

Range 0–255

Field Entry `ChCode Dat`

Remarks This command affects the PRACH setting on the multiple PRACH mode only.

:ULINk:PRACh:MULTi:UE[1]|2|3|4|5|6|7|8:PREamble:SIGNature

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MULTi:UE[1]|2|3|4|5|6|7|8:
PREamble:SIGNature <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MULTi:UE[1]|2|3|4|5|6|7|8:
PREamble:SIGNature?
```

This command sets the signature encoded in the multiple physical random access channel's (PRACH) preamble.

***RST**

	Signature

UE	1	0
	2	1
	3	2
	4	3
	5	4
	6	5
	7	6
	8	7

Field Entry `Pre Sig`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:ULINk:APPLy” on page 1084.

:ULINk:PRACh:MULTi:UE[1]|2|3|4|5|6|7|8:SPOSition[1]|2|3|4|5|6|7|8[:ASLot]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MULTi:UE[1]|2|3|4|5|6|7|8:
SPOSition[1]|2|3|4|5|6|7|8[:ASLot] <val>|OFF
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MULTi:UE[1]|2|3|4|5|6|7|8:
SPOSition[1]|2|3|4|5|6|7|8[:ASLot]?
```

This command sets each physical random access channel (PRACH) start access slot position within 80ms.

*RST

		Start Access Slot Pos							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
UE	1	0	OFF	OFF	OFF	OFF	OFF	OFF	OFF
	2	0	OFF	OFF	OFF	OFF	OFF	OFF	OFF
	3	0	OFF	OFF	OFF	OFF	OFF	OFF	OFF
	4	0	OFF	OFF	OFF	OFF	OFF	OFF	OFF
	5	0	OFF	OFF	OFF	OFF	OFF	OFF	OFF
UE	6	0	OFF	OFF	OFF	OFF	OFF	OFF	OFF
	7	0	OFF	OFF	OFF	OFF	OFF	OFF	OFF
	8	0	OFF	OFF	OFF	OFF	OFF	OFF	OFF

Range 0–59

Field Entry `Start Access Slot Position in 80ms Period`

Remarks This command can only be executed while in the PRACH Mode is set to Multi. Refer to “:ULINk:PRACh:MODE[:SELect]” on page 1126.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:ULINk:APPLy” on page 1084.

:ULINk:PRACh:MULTi:UE[1]|2|3|4|5|6|7|8[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MULTi:UE[1]|2|3|4|5|6|7|8
[:STATe] 0|1|ON|OFF
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:MULTi:UE[1]|2|3|4|5|6|7|8
[:STATe]?
```

This command enables or disables each physical random access channel (PRACH) individually on the multiple PRACH mode.

***RST**

		State
UE	1	ON
	2	OFF
	3	OFF
	4	OFF
	5	OFF
	6	OFF
	7	OFF
	8	OFF

Field Entry `On/Off`

Remarks This command will not run if the power of all assigned physical random access channels exceed the power of the signal generator.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh:PREamble:POWer:AVERage

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:PREamble:POWer:AVERage?
```

This query returns the average power of preambles that were sent before the acquisition indication channel (AICH) trigger was received.

***RST** –999

Field Entry `Preamble power average`

Remarks The average power value can be queried after the physical random access channel's (PRACH) signal generation is completed. Refer to ":ULINk:PRACh[:SINGle]:PREamble:NUMBer" on page 1143.

:ULINk:PRACh:PREamble:POWer:MODE

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:PREamble:POWer:MODE PPM|
TOTal
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:PREamble:POWer:MODE?
```

This command sets the message power calculation mode for the physical random access channel (PRACH).

PPM This choice calculates the message power based on the power differences between the preamble and the message control part. The difference is specified by the PPM command. This is based on 3GPP standards.

TOTal This choice calculates message power based on power differences between preamble and message total part. The message total power is specified by the MESSage:TPOWer command. Refer to ":ULINk:PRACh[:SINGle]:MESSage:TPOWer" on page 1142.

***RST** PPM

Key Entry **PRACH Power Setup Mode Pp-m Total**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh:RPARameter

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:RPARameter TB168|TB360
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:RPARameter?
```

This command sets a set of parameters as defined in 3GPP Standard (TS25.104) Reference Measurement Channel for the uplink (UL) physical random access channel (PRACH).

TB168 This choice sets the parameters for the transport block size = 168.

TB360 This choice sets the parameters for the transport block size = 360.

***RST** TB168

Key Entry **TrCh BlkSize 168** **TrCh BlkSize 360**

Remarks When parameters are sets individually, CUSTom is returned for the query.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh:SCRamblecode

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:SCRamblecode <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:SCRamblecode?
```

This command sets the physical random access channel's (PRACH) scrambling code.

***RST** +0

Range 0–8191

Field Entry `PRACH Scrambling Code`

Remarks The signature data is scrambled against a 4096 chip segment of the 225 complex gold code generator.

If the parameter set by this command is changed while the signal is

active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh:SDELay

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:SDELay <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:SDELay?
```

This command sets the number of timeslots to be delayed from the uplink synchronization source. One timeslot is equivalent to 2560 chips.

The variable `<val>` range is dependent on the Tp-a setting.

***RST** +0

Range

Tp-a Setting	<val>
0	-14 to 119
7680	-11 to 119
12800	-9 to 119

Key Entry **Timeslot Offset**

Remarks The actual amount of timing difference is (TOFFset + SDELay * 2560) – (Tp–a).

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

To set the Tp-a value, refer to ":ULINk:PRACh:TPA" on page 1136.

:ULINk:PRACh:SUBChannel

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:SUBChannel <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:SUBChannel?
```

This command sets the sub-channel number to send the first preamble of the physical random access channel's (PRACH).

***RST** +0

Range 0–11

Field Entry `Start Sub-Channel#`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh:TOFFset

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:TOFFset <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:TOFFset?
```

This command sets additional timing offset for the physical random access channel (PRACH).

The timing offset is to adjust the time distance from the uplink PRACH frame timing which is the downlink's AICH framing timing minus the Tp–a to the actual uplink PRACH signal frame timing from the signal generator.

The downlink's AICH frame timing is provided by the synchronization signal. The

The variable `<val>` is expressed in chips.

***RST** +0

Range –512 to 2560

Key Entry **Timing Offset**

Remarks The actual timing offset is the timing difference from the synchronization signal from the signal generator's RF signal
(TOFFset + SDELay * 2560) – (Tp–a).

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh:TPA

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:TPA 0|7680|12800
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:TPA?
```

This command sets the time period (distance) between the physical random access channel's (PRACH) preamble to the acquisition indication channel's (AICH) frame.

The variable `<val>` is expressed in units of "chip".

***RST** 7680

Key Entry **Base Delay Tp–a**

Remarks The actual timing offset is (TOFFset + SDELay * 2560) – (Tp–a).

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

This command is not used when the sync source is set to ESG. Refer to ":ULINk:SYNC[:SOURce]" on page 1161.

:ULINk:PRACh:TPM

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:TPM <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:TPM?
```

This command sets the time period between the preamble and the message part.

The variable `<val>` is expressed in access slot units.

***RST** +3

Range 1–15

Field Entry `Tp-m`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:ULINk:APPLy” on page 1084.

This command is used for single and multiple physical random access channel (PRACH) modes.

:ULINk:PRACh:TPOWer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:TPOWer?
```

This query returns the total power value of the physical random access channels (PRACH).

The value is the relative power difference between the total in-channel signal power of the PRACH message part and the active channel reference power (0dB) in the message part.

***RST** +0

Remarks This command is used for single and multiple physical random access channel (PRACH) modes.

:ULINk:PRACh:TPP

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:TPP <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:TPP?
```

This command sets the time period between the preamble and another preamble before the message part.

The variable `<val>` is expressed in access slot units.

***RST** +3

Range 1–60

Field Entry `Tp-p`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

This command is used for single and multiple physical random access channel (PRACH) modes.

:ULINk:PRACh:TRIGger

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:TRIGger
```

This command specifies the start of the physical random access channel's (PRACH) pattern.

Key Entry **PRACH Trigger**

Remarks The PRACH trigger source must be set to "Trigger" before executing this command. Refer to ":ULINk:PRACh:TRIGger:SOURce" on page 1138.

:ULINk:PRACh:TRIGger:POLarity

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:TRIGger:
POLarity POSitive|NEGative
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:TRIGger:POLarity?
```

This command sets the trigger polarity of the physical random access channel type (PRACH).

POSitive This choice sets the signal to trigger when the trigger signal is high.

NEGative This choice sets the signal to trigger when the trigger signal is low.

***RST** POS

Key Entry **PRACH Trigger Polarity Neg Pos**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh:TRIGger:SOURce

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:TRIGger:
SOURce IMMediate|TRIGger
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:TRIGger:SOURce?
```

This command sets the trigger source of the physical random access channel (PRACH).

IMMediate	This choice resets the waveform and immediately replays it from the start.
TRIGger	This choice plays the waveform after receiving the trigger command.
***RST**	IMMediate
Key Entry	**PRACH Trigger Source Immedi Trigger**
Remarks	Refer to ":ULINk:PRACh:TRIGger:POLarity" on page 1138 and ":ULINk:PRACh:TRIGger" on page 1138 for additional information. If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh:TTI

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:TTI 10000|20000
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh:TTI?
```

This command sets the transmission time interval (TTI) period of the message part.

The choices are expressed in units of milliseconds (msec) where 20000=20 msec.

***RST**	+20000
Field Entry	`TTI`
Remarks	If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh[:SINGle]:MESSage[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:MESSage[:STATe]
ON|OFF|AICH
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:MESSage[:STATe]?
```

This command enables or disables the message part of the physical random access channel (PRACH).

ON	This choice enables the message part to be generated after the number of preambles are generated. The "Number of Preamble" must be specified.

OFF — This choice does not allow the message part to be generated. Only the preambles are transmitted.

AICH — This choice enables the acquisition indication channel preamble power ramping mode.

***RST** — ON

Key Entry — **On** **Off** **AICH**

Remarks — For more information about the rear panel AUX I/O connector, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh[:SINGle]:NUMBer

Supported — E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:NUMBer <val>|
INFinity
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:NUMBer?
```

This command specifies the number of the physical random access channel (PRACH) patterns to repeat after the PRACH start trigger has been received.

INFinity — This choice means the repeating number will continue while the PRACH mode is selected and the start trigger is ignored.

***RST** — 1

Range — 1–2147483647

Field Entry — `Number of PRACH`

Remarks — If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh[:SINGle]:MESSage:CPARt:CCODe

Supported — E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:MESSage:CPARt:
CCODe <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:MESSage:CPARt:
```

`CCODe?`

This command sets the channelization code for the physical random access channel (PRACH) message control part.

***RST** +15

Range 0–255

Field Entry `Channel Code`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh[:SINGle]:MESSage:DPARt:CCODe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:MESSage:DPARt:
CCODe <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:MESSage:DPARt:
CCODe?
```

This command sets the channelization code for the physical random access channel (PRACH) message data part.

There are commands that are associated with the channelization code and they are the slot format and the symbol rate.

If the slot format is changed, so will the symbol rate. If the symbol rate is changed, so will the slot format. In addition, the channelization code will change. If current channelization code exceed the new maximum value for the specified slot format or symbol rate, a setting conflict error is generated and the value is clipped to the maximum value. Refer to Table 9-9.

Table 9-9 Channelization Code Maximum value

Channelization Code	Slot Format	Symbol Rate
255	0	15
127	1	30
63	2	60
31	3	120

***RST** +0

Range 0–255

Field Entry `Channel Code`

Remarks Channel code value is determined by slot format choice. Refer to ":ULINk:PRACh:MESSage:DPARt:SLOTformat" on page 1125 and ":ULINk:PRACh:MESSage:DPARt:RATE" on page 1124.
If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh[:SINGle]:MESSage:TPOWer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:MESSage:
TPOWer <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:MESSage:TPOWer?
```

This command sets the message total power value for the single physical random access channel (PRACH) and multiple PRACH modes. The variable `<val>` is expressed in units of decibels (dB). The RF output power is limited to the signal generator's specifications

***RST** –1.36000000E+002

Range –136 to 20

Field Entry `Msg Pwr`

Remarks This value is used only when POWer:MODE is set to TOTal. Refer to ":ULINk:PRACh:PREamble:POWer:MODE" on page 1133.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh[:SINGle]:NUMBer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:
NUMBer <val>|INFinity
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:NUMBer?
```

This command specifies the number of the physical random access channel (PRACH) patterns to repeat after the PRACH start trigger has been received.

INFinity	This choice means the repeating number will continue while the PRACH mode is selected and the start trigger is ignored.
***RST**	1
Range	1–2147447836
Field Entry	`Number of PRACH`
Remarks	If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh[:SINGle]:PREamble:NUMBer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:PREamble:
NUMBer <val>|INFinity
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:PREamble:NUMBer?
```

This command specifies the number of preambles to repeat in one physical random access channel (PRACH) pattern.

INFinity	This choice means the repeating preamble will play continuously while the PRACH mode is selected.
***RST**	1
Range	1–8388607
Field Entry	PRACH Timing Setup: `Number of Preamble`
	PRACH Power Setup: `Num of Pre`

:ULINk:PRACh[:SINGle]:PREamble:POWer:INITial

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:PREamble:
POWer:INITial?
```

This query returns the initial preamble power from POWer:Max value, RSTEp (ramp step) and PREamble:NUMBer commands.

***RST**	–1.36000000E+002
Field Entry	`Init Pwr`

:ULINk:PRACh[:SINGle]:PREamble:POWer:MAX

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:PREamble:
POWer:MAX <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:PREamble:
POWer:MAX?
```

This command sets the maximum preamble power for the physical random access channel (PRACH).

In power ramping mode (RSTep is a non-zero value), the preamble power can go up until the acquisition indication channel's (AICH) signal is not received (maximum power).

The variable `<val>` is expressed in units of decibels (dB).

***RST** –1.36000000E+002

Range –136 to 20

Field Entry `Max Pwr`

Remarks The actual RF output is limited to the signal generator's specifications although the value can be entered up to 20 dBm.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh[:SINGle]:PREamble:POWer:RSTep

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:PREamble:POWer:
RSTep <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:PREamble:POWer:
RSTep?
```

This command sets the power ramping steps for the single physical random access channel (PRACH) preamble.

The variable `<val>` is expressed in units of decibels (dB).

***RST** 0

Range 0–10

Field Entry `Ramp Step`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

This command is used for single and multiple physical random access channel (PRACH) modes.

:ULINk:PRACh[:SINGle]:PREamble:PPM

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:PREamble:PPM <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:PREamble:PPM?
```

This command sets the power difference between the preamble and the message control part in the single physical random access channel (PRACH).

The variable `<val>` is expressed in units of decibels (dB).

***RST** –4.56032509E+000

Range –20 to 10

Field Entry `Pp-m`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:PRACh[:SINGle]:PREamble:SIGNature

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGle]:PREamble:
SIGNature <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:PRACh[:SINGLe]:PREamble:
SIGNature?
```

This command sets the signature encoded in the single physical random access channel's (PRACH) preamble.

***RST** +0

Range 0–15

Field Entry `Signature`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:RMCHannel

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RMCHannel RMC122|RMC64|RMC144|
RMC384|UDI64|AMR122
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RMCHannel?
```

This command configures the uplink reference measurement (RMC) channel by providing a one command access to a typical RMC configuration.

RMC122 This choice selects a reference measurement channel with a 12.2 kbps rate as per 3GPP TS 25.141.

RMC64 This choice selects a reference measurement channel with a 64.0 kbps rate as per 3GPP TS 25.141.

RMC144 This choice selects a reference measurement channel with a 144.0 kbps rate as per 3GPP TS 25.141.

RMC384 This choice selects a reference measurement channel with a 384.0 kbps rate as per 3GPP TS 25.141.

UDI64 This choice selects an ISDN unrestricted digital information 1B with a 64.0 kbps rate as per 3GPP TS 25.944.

ARM122 This choice selects an adaptive multiple rate of 12.2 kbps as per 3GPP TS 25.944.

***RST** RMC122

Key Entry **RMC122 kbps (25.141)** **RMC64 kbps (25.141)**

RMC144 kbps (25.141) **RMC384 kbps (25.141)**

AMR 122 kbps **UDI 64 kbps**

:ULINk:RPANel:DPCH:INPut:ALTPower

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:DPCH:INPut:ALTPower?
```

This query returns the type of signal at the alternate power input (ALT PWR IN, AUX I/O connector pin#16) for the dedicated physical channel (DPCH) mode.

***RST** USER

Remarks The signal name is TPC user file trigger (USER). For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:DPCH:INPut:BBGRef

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:DPCH:INPut:BBGRef?
```

This query returns the type of signal at the baseband generator reference input (BASEBAND GEN REF IN, rear panel connector) for the dedicated physical channel (DPCH) mode.

***RST** CCL

Remarks The signal name is baseband generator chip clock (CCL). For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:DPCH:INPut:BGATe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:DPCH:INPut:BGATe?
```

This query returns the type of signal at the gate burst (BURST GATE IN, rear panel connector) for the dedicated physical channel (DPCH) mode.

***RST** CSTT

Remarks In compressed mode the signal name is compressed mode start trigger (CSST). In power control mode, the signal name is DPCH power control signal (DPCS). For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*

:ULINk:RPANel:DPCH:INPut:PTRigger1

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:DPCH:INPut:PTRigger1?
```

This query returns the type of signal at the pattern trigger input 1 (PATT TRIG IN 1, rear panel) for the dedicated physical channel (DPCH) mode.

***RST** FSYN

Remarks The signal name is frame synchronization (FSYN). For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:DPCH:INPut:PTRigger2

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:DPCH:INPut:PTRigger2?
```

This query returns the type of signal at the pattern trigger input 2 (PATT TRIG IN 2, AUX I/O connector pin#17) for the dedicated physical channel (DPCH) mode.

***RST** CSPT

Remarks The signal name is compress mode stop trigger (CSPT). For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:DPCH:OUTPut:DCLock

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:DPCH:OUTPut:DCLock RPS0|
RPS1|RPS2|RPS3|RPS4|RPS5|RPS6|RPS7|RPS8|RPS9|RPS10
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:DPCH:OUTPut:DCLock?
```

This command assigns a signal to the data clock output at the selected rear panel AUX I/O connector pin#6. Refer to Table 9-10 on page 1148 for command parameters and output signal type.

Table 9-10 Rear Panel Signal (RPS) Output Type

Command Parameter	Signal Out
RPS0	None
RPS1	Chip Clock
RPS2	DPDCH raw data
RPS3	DPDCH raw data clock
RPS4	DPCCH raw data
RPS5	DPCCH raw data clock

Table 9-10 Rear Panel Signal (RPS) Output Type

Command Parameter	Signal Out
RPS6	10ms frame pulse
RPS7	Trigger sync reply
RPS8	Compressed frame
RPS9	TTI frame pulse
RPS10	CFN #0 frame pulse

***RST** RPS1

Key Entry **NONE (RPS0)** **Chip Clock (RPS1)** **DPDCH Raw Data (RPS2)**
DPDCH Data Raw Clock (RPS3) **DPCCH Raw Data (RPS4)**
DPCCH Raw Data Clock (RPS5) **10 ms Frame Pulse (RPS6)**
Trigger Sync Reply (RPS7) **Compressed Frame (RPS8)**
TTI Frame Clock (RPS9) **CFN #0 Frame Pulse (RPS10)**

Remarks For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:DPCH:OUTPut:DOUT

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:DPCH:OUTPut:DOUT RPS0|
RPS1|RPS2|RPS3|RPS4|RPS5|RPS6|RPS7|RPS8|RPS9|RPS10
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:DPCH:OUTPut:DOUT?
```

This command assigns a signal to the data output at the selected rear panel AUX I/O connector pin#7. Refer to Table 9-10 on page 1148 for command parameters and output signal type.

***RST** RPS4

Key Entry **NONE (RPS0)** **Chip Clock (RPS1)** **DPDCH Raw Data (RPS2)**
DPDCH Data Raw Clock (RPS3) **DPCCH Raw Data (RPS4)**
DPCCH Raw Data Clock (RPS5) **10 ms Frame Pulse (RPS6)**
Trigger Sync Reply (RPS7) **Compressed Frame (RPS8)**
TTI Frame Clock (RPS9) **CFN #0 Frame Pulse (RPS10)**

Remarks For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:DPCH:OUTPut:EVENt1

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:DPCH:OUTPut:
EVENt1 RPSO|RPS1|RPS2|RPS3|RPS4|RPS5|RPS6|RPS7|RPS8|RPS9|RPS10
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:DPCH:OUTPut:EVENt1?
```

This command assigns a signal to the EVENT 1 at the rear panel output connector. Refer to Table 9-10 on page 1148 for command parameters and output signal type.

***RST** RPS2

Key Entry **NONE (RPS0)** **Chip Clock (RPS1)** **DPDCH Raw Data (RPS2)**

DPDCH Data Raw Clock (RPS3) **DPCCH Raw Data (RPS4)**

DPCCH Raw Data Clock (RPS5) **10 ms Frame Pulse (RPS6)**

Trigger Sync Reply (RPS7) **Compressed Frame (RPS8)**

Frame Clock (RPS9) **CFN #0 Frame Pulse (RPS10)**

Remarks For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:DPCH:OUTPut:EVENt2

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:DPCH:OUTPut:
EVENt2 RPSO|RPS1|RPS2|RPS3|RPS4|RPS5|RPS6|RPS7|RPS8|RPS9|RPS10
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:DPCH:OUTPut:EVENt2?
```

This command assigns a signal to the EVENT 2 at the rear panel output connector. Refer to Table 9-10 on page 1148 for command parameters and output signal types.

***RST** RPS3

Key Entry **NONE (RPS0)** **Chip Clock (RPS1)** **DPDCH Raw Data (RPS2)**

DPDCH Data Raw Clock (RPS3) **DPCCH Raw Data (RPS4)**

DPCCH Raw Data Clock (RPS5) **10 ms Frame Pulse (RPS6)**

Trigger Sync Reply (RPS7) **Compressed Frame (RPS8)**

TTI Frame Clock (RPS9) **CFN #0 Frame Pulse (RPS10)**

Remarks For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:DPCH:OUTPut:EVENt3

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:DPCH:OUTPut:
EVENt3 RPS0|RPS1|RPS2|RPS3|RPS4|RPS5|RPS6|RPS7|RPS8|RPS9|RPS10
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:DPCH:OUTPut:EVENt3?
```

This command assigns a signal to the EVENT 3 output at the selected rear panel AUX I/O connector pin#19. Refer to Table 9-10 on page 1148 for command parameters and output signal type.

***RST** RPS0

Key Entry **NONE (RPS0)** **Chip Clock (RPS1)** **DPDCH Raw Data (RPS2)**

DPDCH Data Raw Clock (RPS3) **DPCCH Raw Data (RPS4)**

DPCCH Raw Data Clock (RPS5) **10 ms Frame Pulse (RPS6)**

Trigger Sync Reply (RPS7) **Compressed Frame (RPS8)**

TTI Frame Clock (RPS9) **CFN #0 Frame Pulse (RPS10)**

Remarks For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:DPCH:OUTPut:EVENt4

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:DPCH:OUTPut:
EVENt4 RPS0|RPS1|RPS2|RPS3|RPS4|RPS5|RPS6|RPS7|RPS8|RPS9|RPS10
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:DPCH:OUTPut:EVENt4?
```

This command assigns a signal to the EVENT 4 output at the selected rear panel AUX I/O connector pin#18. Refer to Table 9-10 on page 1148 for command parameters and output signal type.

***RST** RPS0

Key Entry **NONE (RPS0)** **Chip Clock (RPS1)** **DPDCH Raw Data (RPS2)**

DPDCH Data Raw Clock (RPS3) **DPCCH Raw Data (RPS4)**

DPCCH Raw Data Clock (RPS5) **10 ms Frame Pulse (RPS6)**

Trigger Sync Reply (RPS7) **Compressed Frame (RPS8)**

TTI Frame Clock (RPS9) **CFN #0 Frame Pulse (RPS10)**

Remarks For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:DPCH:OUTPut:SSYNc

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:DPCH:OUTPut:SSYNc RPS0|
RPS1|RPS2|RPS3|RPS4|RPS5|RPS6|RPS7|RPS8|RPS9|RPS10
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:DPCH:OUTPut:SSYNc?
```

This command assigns a signal to SYM SYNC OUT at the selected rear panel AUX I/O connector pin#5. Refer to Table 9-10 on page 1148 for command parameters and output signal type.

***RST** RPS6

Key Entry **NONE (RPS0)** **Chip Clock (RPS1)** **DPDCH Raw Data (RPS2)**

DPDCH Data Raw Clock (RPS3) **DPCCH Raw Data (RPS4)**

DPCCH Raw Data Clock (RPS5) **10 ms Frame Pulse (RPS6)**

Trigger Sync Reply (RPS7) **Compressed Frame (RPS8)**

TTI Frame Clock (RPS9) **CFN #0 Frame Pulse (RPS10)**

Remarks For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:PRACh:INPut:ALTPower

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:PRACh:INPut:ALTPower?
```

This query returns the signal type at the ALT PWR IN (alternate power in) connector pin for the physical random access channel (PRACH) mode.

***RST** NONE

Field Entry `Alt power in`

Remarks For more information about the rear panel AUX I/O connector pin configuration, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:PRACh:INPut:BBGRef

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:PRACh:INPut:BBGRef?`

This query returns the type of signal at the baseband generator reference input (BASEBAND GEN REF IN, rear panel connector) for the physical random access channel (PRACH) mode.

***RST** CCL

Remarks The signal name is baseband generator chip clock (CCL). For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:PRACh:INPut:BGATe

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:PRACh:INPut:BGATe?`

This query returns the signal type at the BURST GATE IN connector for the physical random access channel (PRACH) mode.

***RST** PSTR

Field Entry `Burst gate in`

Remarks The signal name is PRACH start trigger (PSTR). For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:PRACh:INPut:PTRigger1

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:PRACh:INPut:PTRigger1?`

This query returns the signal type at the pattern trigger in 1 (PATT TRIG IN) connector for the physical random access channel (PRACH) mode.

***RST** FSYN

Field Entry `Pattern trigger in 1`

Remarks The signal name is frame synchronization (FSYN). For more information about the rear panel I/O connectors' configuration, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:PRACh:INPut:PTRigger2

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:PRACh:INPut:PTRigger2?`

This query returns the signal type at the pattern trigger input 2 (PATT TRIG IN 2 AUX I/O connector pin#17) for the physical random access channel (PRACH) mode.

***RST** AITR

Field Entry `Pattern trigger in 2`

Remarks The signal name is AICH trigger (AITR). For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:PRACh:OUTPut:DCLock

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:PRACh:OUTPut:DCLock RPS0|
RPS1|RPS6|RPS7|RPS11|RPS12|RPS13|RPS14|RPS15|RPS16|
RPS17|RPS19|RPS20|RPS21|RPS22|RPS23|RPS24|RPS25
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:PRACh:OUTPut:DCLock?
```

This command assigns a signal at the data clock output for the selected rear panel AUX I/O connector pin#6.

RPS0 none

RPS1 This choice assigns the chip clock signal.

RPS6 This choice assigns the 10ms frame pulse signal.

RPS7 This choice assigns the trigger sync reply signal.

RPS11 This choice assigns the message-data raw data signal. In the multiple PRACH mode, RPS11 outputs the message-data raw data signal of PRACH#1. If the PRACH#1 is not “on”, no signal output is output.

RPS12 This choice assigns the message-data raw clock signal. In the multiple PRACH mode, RPS12 outputs the message-data raw clock signal of PRACH#1. If the PRACH#1 is not “on”, no signal output is output.

RPS14 This choice assigns the message-ctrl raw data clock signal. In the multiple PRACH mode, RPS14 outputs the message-control raw data clock signal of PRACH#1. If the PRACH#1 is not “on”, no signal output is output.

RPS15 This choice assigns the preamble raw data signal. In the multiple PRACH mode, RPS15 outputs the preamble raw data signal of PRACH#1. If the PRACH#1 is not “on”, no signal output is output.

RPS16	This choice assigns the preamble raw data clock signal. In the multiple PRACH mode, RPS16 outputs the preamble raw data clock signal of PRACH#1. If the PRACH#1 is not “on”, no signal output is output.
RPS17	This choice assigns the sub channel timing signal. Sub channel timing is used on the single PRACH mode.
RPS19	This choice assigns the PRACH processing signal. This signal indicates the PRACH is generating.
RPS20	This choice assigns the 80ms frame pulse signal.
RPS21	This choice assigns the preamble pulse signal. This signal indicates the preamble timing of all configured PRACHes. One pulse for one preamble. In the multiple PRACH mode, this output relates to PRACH#1. If the PRACH#1 in not “on”, no signal is output.
RPS22	This choice assigns the message pulse signal. This signal indicates the message part timing of all configured PRACHes. In the multiple PRACH mode, this output relates to PRACH#1. If the PRACH#1 in not “on”, no signal is output.
RPS23	This choice assigns the PRACH pulse signal. This signal indicates the start timing of all configured PRACHes. In the multiple PRACH mode, this output relates to PRACH#1. If the PRACH#1 in not “on”, no signal is output.
RPS24	This choice assigns the ESG synchronization signal. This signal is used for the multiple EAG synchronization on the multiple PRACH mode.
RPS25	This choice assigns the PRACH start trigger echo back signal. The PRACH start trigger echo back signal is used for the multiple ESG connection on the multiple PRACH mode.

***RST** RPS0

Key Entry

NONE (RPS0) **Chip Clock (RPS1)** **Message-Data Raw Data (RPS11)**

10ms Frame Pulse (RPS6) **Trigger Sync Reply (RPS7)**

Message-Data Raw Clock (RPS12) **Message-Control Raw Data (RPS13)**

Message-Control Raw Data Clock(RPS14)

Preamble Raw Data(RPS15) **Preamble Raw Data Clock(RPS16)**

Sub Channel Timing(RPS17) **PRACH Processing(RPS19)**

80ms Frame Pulse(RPS20) **Preamble Pulse(RPS21)**

Message Pulse(RPS22) **PRACH Pulse(RPS23)**

ESG-Sync Sig(RPS24) **Start-Trigger EchoBack(RPS25)**

Remarks For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:PRACh:OUTPut:DOUT

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:PRACh:OUTPut:DOUT RPS0|
RPS1|RPS6|RPS7|RPS11|RPS12|RPS13|RPS14|RPS14|RPS15|RPS16|RPS17|RPS19|
RPS20|RPS21|RPS22|RPS23|RPS24|RPS25
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:PRACh:OUTPut:DOUT?
```

This command assigns a signal to the data output at the selected rear panel AUX I/O connector pin#7.

For parameter descriptions refer to ":ULINk:RPANel:PRACh:OUTPut:DCLock" on page 1154.

***RST** RPS0

Key Entry **NONE (RPS0)** **Chip Clock (RPS1)** **Message-Data Raw Data (RPS11)**

10ms Frame Pulse (RPS6) **Trigger Sync Reply (RPS7)**

Message-Data Raw Clock (RPS12) **Message-Control Raw Data (RPS13)**

Message-Control Raw Data Clock(RPS14)

Preamble Raw Data(RPS15) **Preamble Raw Data Clock(RPS16)**

Sub Channel Timing(RPS17) **PRACH Processing(RPS19)**

80ms Frame Pulse(RPS20) **Preamble Pulse(RPS21)**

Message Pulse(RPS22) **PRACH Pulse(RPS23)**

ESG-Sync Sig(RPS24) **Start-Trigger EchoBack(RPS25)**

Remarks For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:PRACh:OUTPut:EVENt1

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:PRACh:OUTPut:EVENt1 RPS0|
RPS1|RPS6|RPS7|RPS11|RPS12|RPS13|RPS14|RPS14|RPS15|RPS16|RPS17|RPS19|
RPS20|RPS21|RPS22|RPS23|RPS24|RPS25
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:PRACh:OUTPut:EVENt1?
```

This command assigns a signal to the EVENT 1 at the selected rear panel connector.

For parameter descriptions refer to ":ULINk:RPANel:PRACh:OUTPut:DCLock" on page 1154.

***RST** RPS0

Key Entry **NONE (RPS0)** **Chip Clock (RPS1)** **Message-Data Raw Data (RPS11)**

10ms Frame Pulse (RPS6) **Trigger Sync Reply (RPS7)**

Message-Data Raw Clock (RPS12) **Message-Control Raw Data (RPS13)**

Message-Control Raw Data Clock(RPS14)

Preamble Raw Data(RPS15) **Preamble Raw Data Clock(RPS16)**

Sub Channel Timing(RPS17) **PRACH Processing(RPS19)**

80ms Frame Pulse(RPS20) **Preamble Pulse(RPS21)**

Message Pulse(RPS22) **PRACH Pulse(RPS23)**

ESG-Sync Sig(RPS24) **Start-Trigger EchoBack(RPS25)**

Remarks For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:PRACh:OUTPut:EVENt2

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:PRACh:OUTPut:EVENt2` RPS0|RPS1|RPS6|RPS7|RPS11|RPS12|RPS13|RPS14|RPS14|RPS15|RPS16|RPS17|RPS19|RPS20|RPS21|RPS22|RPS23|RPS24|RPS25
`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:PRACh:OUTPut:EVENt2?`

This command assigns a signal to the EVENT 2 at the rear panel connector.

For parameter descriptions refer to ":ULINk:RPANel:PRACh:OUTPut:DCLock" on page 1154.

***RST** RPS0

Key Entry **NONE (RPS0)** **Chip Clock (RPS1)** **Message-Data Raw Data (RPS11)**

10ms Frame Pulse (RPS6) **Trigger Sync Reply (RPS7)**

Message-Data Raw Clock (RPS12) **Message-Control Raw Data (RPS13)**

Message-Control Raw Data Clock(RPS14)

Preamble Raw Data(RPS15) **Preamble Raw Data Clock(RPS16)**

Sub Channel Timing(RPS17) **PRACH Processing(RPS19)**

80ms Frame Pulse(RPS20) **Preamble Pulse(RPS21)**

Message Pulse(RPS22) **PRACH Pulse(RPS23)**

ESG-Sync Sig(RPS24) **Start-Trigger EchoBack(RPS25)**

Remarks For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:PRACh:OUTPut:EVENt3

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:PRACh:OUTPut:EVENt3 RPS0|
RPS1|RPS6|RPS7|RPS11|RPS12|RPS13|RPS14|RPS14|RPS15|RPS16|RPS17|RPS19|
RPS20|RPS21|RPS22|RPS23|RPS24|RPS25
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:PRACh:OUTPut:EVENt3?
```

This command assigns a signal to the EVENT 3 output at the selected rear panel AUX I/O connector pin#19.

For parameter descriptions refer to ":ULINk:RPANel:PRACh:OUTPut:DCLock" on page 1154.

***RST** RPS0

Key Entry **NONE (RPS0)** **Chip Clock (RPS1)** **Message-Data Raw Data (RPS11)**

10ms Frame Pulse (RPS6) **Trigger Sync Reply (RPS7)**

Message-Data Raw Clock (RPS12) **Message-Control Raw Data (RPS13)**

Message-Control Raw Data Clock(RPS14)

Preamble Raw Data(RPS15) **Preamble Raw Data Clock(RPS16)**

Sub Channel Timing(RPS17) **PRACH Processing(RPS19)**

80ms Frame Pulse(RPS20) **Preamble Pulse(RPS21)**

Message Pulse(RPS22) **PRACH Pulse(RPS23)**

ESG-Sync Sig(RPS24) **Start-Trigger EchoBack(RPS25)**

Remarks For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:PRACh:OUTPut:EVENt4

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:PRACh:OUTPut:EVENt4 4RPS0|
RPS1|RPS6|RPS7|RPS11|RPS12|RPS13|RPS14|RPS14|RPS15|RPS16|RPS17|RPS19|
RPS20|RPS21|RPS22|RPS23|RPS24|RPS25
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:PRACh:OUTPut:EVENt4?
```

This command assigns a signal to the EVENT 4 output at the selected rear panel AUX I/O connector pin#18.

For parameter descriptions refer to ":ULINk:RPANel:PRACh:OUTPut:DCLock" on page 1154.

***RST** RPS0

Key Entry **NONE (RPS0)** **Chip Clock (RPS1)** **Message-Data Raw Data (RPS11)**

10ms Frame Pulse (RPS6) **Trigger Sync Reply (RPS7)**

Message-Data Raw Clock (RPS12) **Message-Control Raw Data (RPS13)**

Message-Control Raw Data Clock(RPS14)

Preamble Raw Data(RPS15) **Preamble Raw Data Clock(RPS16)**

Sub Channel Timing(RPS17) **PRACH Processing(RPS19)**

80ms Frame Pulse(RPS20) **Preamble Pulse(RPS21)**

Message Pulse(RPS22) **PRACH Pulse(RPS23)**

ESG-Sync Sig(RPS24) **Start-Trigger EchoBack(RPS25)**

Remarks For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:RPANel:PRACh:OUTPut:SSYNc

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:PRACh:OUTPut:SSYNc RPS0|
RPS1|RPS6|RPS7|RPS11|RPS12|RPS13|RPS14|RPS14|RPS15|RPS16|RPS17|RPS19|
RPS20|RPS21|RPS22|RPS23|RPS24|RPS25
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RPANel:PRACh:OUTPut:SSYNc?
```

This command assigns a signal to SYM SYNC OUT at the selected rear panel AUX I/O connector pin#5.

For parameter descriptions refer to ":ULINk:RPANel:PRACh:OUTPut:DCLock" on page 1154.

***RST** RPS0

Key Entry **NONE (RPS0)** **Chip Clock (RPS1)** **Message-Data Raw Data (RPS11)**

10ms Frame Pulse (RPS6) **Trigger Sync Reply (RPS7)**

Message-Data Raw Clock (RPS12) **Message-Control Raw Data (RPS13)**

Message-Control Raw Data Clock(RPS14)

Preamble Raw Data(RPS15) **Preamble Raw Data Clock(RPS16)**

Sub Channel Timing(RPS17) **PRACH Processing(RPS19)**

	80ms Frame Pulse(RPS20)	**Preamble Pulse(RPS21)**
	Message Pulse(RPS22)	**PRACH Pulse(RPS23)**
	ESG-Sync Sig(RPS24)	**Start-Trigger EchoBack(RPS25)**

Remarks For more information about the rear panel connector configurations, refer to "Signal Generator Overview" in the *E4428C/38C ESG Signal Generators User's Guide*.

:ULINk:SCRamblecode

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SCRamblecode <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SCRamblecode?
```

This command sets the uplink scramble code.

***RST** +0

Range 0–16777215

Field Entry `Scrambling Code`

:ULINk:SDELay

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SDELay <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SDELay?
```

This command sets the number of timeslots to be delayed for the dedicated physical channel (DPCH).

***RST** +0

Range 0–119

Key Entry **Timeslot Offset**

Remarks The actual amount of timing offset is (T0) + (TOFFset) + (SDELay) * 2560 chips, where T0 = 1024 chips.

This command is not used when the sync source is set to ESG. Refer to ":ULINk:SYNC[:SOURce]" on page 1161.

:ULINk:SFNRst:POLarity

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SFNRst:POLarity POSitive|NEGative
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SFNRst:POLarity?
```

This command sets the polarity of the system frame number reset signal for the uplink synchronization source.

POSitive	This choice sets the signal to trigger when the trigger signal is high.
NEGative	This choice sets the signal to trigger when the trigger signal is low.
***RST**	POS
Key Entry	**SFN RST Polarity Neg Pos**
Remarks	This command is not used when the sync source is set to ESG. Refer to ":ULINk:SYNC[:SOURce]" on page 1161.

:ULINk:SYNC:MODE

Supported	E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SYNC:MODE SINGle|CONTinuous
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SYNC:MODE?
```

This command selects the uplink frame synchronization triggering mode.

SINGle	This choice sets the signal generator, once triggered, to generate frames based on the reference clock.
CONTinuous	This choice sets the signal generator to continuously align the frame sync trigger signal and the frame timing.
***RST**	SING
Key Entry	**Frame Sync Trigger Mode Single Cont**

:ULINk:SYNC[:SOURce]

Supported	E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SYNC[:SOURce] SFN_RST|FCLock|ESG
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:SYNC[:SOURce]?
```

This command selects the uplink frame synchronization source type.

SFN_RST	This choice sets the signal to trigger on the system frame number reset signal.
FCLock	This choice sets the signal to trigger on the frame clock.
ESG	This choice sets the signal to trigger on the synchronization signal of a primary ESG.

***RST**	FCL
Key Entry	**Sync Source** **SFN** **FClk** **ESG**

:ULINk:TGAP:POFFset

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:POFFset <val>|AUTO
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:POFFset?
```

This command specifies the amount of power to be increased when the data is being compressed for the transmission gap power offset.

AUTO This choice sets the power to increase using the gap pattern parameters calculation based on 3GPP standard. When AUTO is selected, the query returns "AUTO" as the value.

The variable `<val>` is expressed in units of decibels (dB).

***RST** AUTO

Range 0–6

Field Entry `PwrOffs`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:TGAP:PSI[1]|2|3|4|5|6:CFN

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:PSI[1]|2|3|4|5|6:CFN <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:PSI[1]|2|3|4|5|6:CFN?
```

This command sets the connection frame number (CFN) for the first radio frame of the first pattern 1.

***RST** 0

Range 1–255

Field Entry `TGCFN`

Remarks In the signal generator, CFN is counted internally relative to the system sync signal.

:ULINk:TGAP:PSI[1]:CMMethod

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:PSI[1]:CMMethod SF2|HIGHer
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:PSI[1]:CMMethod?
```

This command selects the compressed mode (CM) method.

SF2 This choice selects a compressed mode method that reduced the spread factor (SF) by 2. This is done by increasing the data rate by reducing the spreading factor in half. When the dedicated physical data channel’s (DPDCH) symbol rate is 960 kbps, the frame is not compressed because it uses the lowest SF value and it cannot be reduced.

HIGHer This choice selects a higher layer scheduling method. The emulated higher layer scheduling method mode keeps the same physical layer data rate even when a transmission gap is created.

***RST** SF2

Key Entry **SF/2** **Higher Layer**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:ULINk:APPLy” on page 1084.

The ULINk:APPLy command will fail if the CM method is higher layer and DPDCH data is TrCH. CM method should be SF/2 if the DPDCH data is TrCH.

:ULINk:TGAP:PSI[1]|2|3|4|5|6:D

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:PSI[1]|2|3|4|5|6:D
<val>|UNDefined
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:PSI[1]|2|3|4|5|6:D?
```

This command sets the transmission gap distance. The command specifies the number of slots between the starting slots of two consecutive transmission gaps within a transmission gap pattern.

UNDefined This choice sets one transmission gap. When UNDefined is selected, then there is only one transmission gap within the transmission gap pattern.

***RST** UND

Range 15–269

Field Entry `TGD`

:ULINk:TGAP:PSI[1]|2|3|4|5|6:L1

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:PSI[1]|2|3|4|5|6
:L1 3|4|5|7|10|14
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:PSI[1]|2|3|4|5|6:L1?
```

This command specifies the length of the first transmission gap (TGL1). The length is expressed in number of slots.

***RST** +7

Field Entry TGL1

:ULINk:TGAP:PSI[1]|2|3|4|5|6:L2

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:PSI[1]|2|3|4|5|6
:L2 3|4|5|7|10|14|OMITted
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:PSI[1]|2|3|4|5|6:L2?
```

This command specifies the length of the second transmission gap (TGL2). When OMITted is selected, TGL2=TGL1.

***RST** OMIT

Field Entry TGL2

:ULINk:TGAP:PSI[1]|2|3|4|5|6:PL1

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:PSI[1]|2|3|4|5|6:PL1 <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:PSI[1]|2|3|4|5|6:PL1?
```

This command specifies the duration of the transmission gap pattern length 1 (TGPL1). The pattern length is expressed in number of frames.

***RST** +2

Range 1–144

Field Entry TGPL1

:ULINk:TGAP:PSI[1]|2|3|4|5|6:PL2

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:PSI[1]|2|3|4|5|6:PL2 <val>|
OMITted
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:PSI[1]|2|3|4|5|6:PL2?
```

This command specifies the duration of the transmission gap pattern length 2 (TGPL2).

The variable `<val>` is expressed in number of frames. When OMITted is selected, TGPL2=TGPL1.

***RST** OMIT

Range 1–144

Field Entry `TGPL2`

Key Entry **Omitted**

:ULINk:TGAP:PSI[1]|2|3|4|5|6:POWer

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:PSI[1]|2|3|4|5|6:POWer?
```

This query returns each power level for a compressed slot.

The return string has five real numbers followed by dBm (for normal power) or dB (for before/after gap power) separated by a single space character. When a value does not exist because of a specified compressed pattern (Example: Gap2 does not exist when TGD is “UNDefined”), it returns “–dB.”

Normal power value represents an actual power level in dBm and relative power is represented in dB.

:ULINk:TGAP:PSI[1]|2|3|4|5|6:PRC

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:PSI[1]|2|3|4|5|6:PRC <val>|
INFinity
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:PSI[1]|2|3|4|5|6:PRC?
```

This command sets the transmission gap pattern repetition count. The pattern repetition count (PRC) sets the number of transmission gap patterns within the transmission gap pattern sequence.

***RST** INF

Range 1–511

Field Entry `TGPRC`

Key Entry **Infinity**

Remarks When INFinity is selected, the PRC will continue indefinitely.

:ULINk:TGAP:PSI[1]|2|3|4|5|6:PS

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:PSI[1]|2|3|4|5|6:PS ACTive|
INACtive
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:PSI[1]|2|3|4|5|6:PS?
```

This command sets the transmission gap pattern status.

ACTive This choice sets the compressed mode active.

INACtive This choice sets the compressed mode inactive.

***RST** INAC

Key Entry **TGPS Active Inactive**

:ULINk:TGAP:PSI[1]|2|3|4|5|6:SN

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:PSI[1]|2|3|4|5|6:SN <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:PSI[1]|2|3|4|5|6:SN?
```

This command specifies the timeslot number of the first transmission gap within the first radio frame.

***RST** +11

Range 0–14

Field Entry `TGSN`

:ULINk:TGAP:RPARameter

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:RPARameter DREF11|DREF12|
DREF21|DREF22
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:RPARameter?
```

This command sets the downlink reference compressed mode parameters as defined in 3GPP Standard TS25.101.

DREF11 This choice sets the reference parameter to 1.1.

DREF12 This choice sets the reference parameter to 1.2.

DREF21	This choice sets the reference parameter to 2.1.
DREF22	This choice sets the reference parameter to 2.2.
***RST**	CUST
Key Entry	**DL Reference 1.1** **DL Reference 1.2** **DL Reference 2.1** **DL Reference 2.2**
Remarks	The query returns CUSTom when the parameters are set individually.

:ULINk:TGAP:SCFN

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:SCFN <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:SCFN?
```

This command sets the stop connection frame number (CFN) when the stop trigger is used.

When the stop trigger is received at the signal generator, the next stop CFN, the compressed mode will finish even if the transmission gap pattern repetition count (TGPRC) is still remaining.

***RST** +0

Range 0–255

Field Entry SCFN

Remarks The compressed mode stop trigger must be used for this command to executed. Refer to “:ULINk:TGAP:STOP:TRIGger” on page 1169.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:ULINk:APPLy” on page 1084.

This command is not used when the sync source is set to ESG. Refer to “:ULINk:SYNC[:SOURce]” on page 1161.

:ULINk:TGAP[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP[:STATe]?
```

This command enables or disables the uplink transmission gap pattern.

***RST** 1

Key Entry **Compress Mode Off On**

:ULINk:TGAP:STARt:TRIGger

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:STARt:TRIGger
```

This command starts the compressed mode trigger.

Key Entry **Compressed Mode Start Trigger**

:ULINk:TGAP:STARt:TRIGger:POLarity

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:STARt:TRIGger:
POLarity POSitive|NEGative
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:STARt:TRIGger:POLarity?
```

This command sets the compressed mode start trigger signal polarity.

POSitive This choice sets the trigger to start when the trigger signal is high.

NEGative This choice sets the trigger to start when the trigger signal is low.

***RST** POS

Key Entry **Comp Mode Start Trigger Polarity Neg Pos**

:ULINk:TGAP:STOP:TRIGger

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:STARt:TRIGger
```

This command stops the compressed mode trigger.

Key Entry **Compressed Mode Stop Trigger**

:ULINk:TGAP:STOP:TRIGger:POLarity

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:STOP:TRIGger:
POLarity POSitive|NEGative
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TGAP:STOP:TRIGger:POLarity?
```

This command sets the compressed mode stop trigger signal polarity.

POSitive	This choice sets the trigger to stop when the trigger signal is high.
NEGative	This choice sets the trigger to stop when the trigger signal is low.
***RST**	POS
Key Entry	**Comp Mode Stop Trigger Polarity Neg Pos**

:ULINk:TOFFset

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TOFFset <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TOFFset?
```

This command sets additional timing offset for the dedicated physical channel (DPCH). Timing offset is the time delay between the downlink signal and the uplink signal. The downlink signal timing is provided by the synchronization signal.

***RST**	+0
Range	–512 to 2560
Key Entry	**Timing Offset**
Remarks	The actual amount of timing offset is (T0) + (TOFFset) + (SDELay) where T0 = 1024 chips.

:ULINk:TSTatus:COMPressed

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TSTatus:COMPressed?
```

This query returns the status of compressed pattern generation. A “0” response indicates the compressed mode pattern signal is not generating. A “1” response indicates that the compressed mode pattern signal is generating.

***RST** 0

:ULINk:TSTatus:RACH

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TSTatus:RACH?
```

This query returns the status of the physical random access channel (PRACH). A “0” response indicates the PRACH signal is not generating. A “1” response indicates that the PRACH signal is generating.

***RST** 0

:ULINk:TSTatus:RECeive

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TSTatus:RECeive?`

This query returns the frame synchronization signal reception status.

When the frame synchronization signal is received after synchronization configuration, the received value becomes "1." If the signal is not received, the value is "0."

***RST** 0

:ULINk:TSTatus:SYNC

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:TSTatus:SYNC?`

This query returns the frame synchronization status. A "0" status indicates frame synchronization is fine or no frame synchronization signal is received). A "1" indicates frame synchronization is out sync and the synchronization signal does not match with the signal generator's timing. The signal generator will generate incorrect data

***RST** 0

:ULINk:[TGRoup[1]]:DCH[1]|2|3|3|5|6:BLKSize

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:[TGRoup[1]]:DCH[1]|
2|3|4|5|6:BLKSize <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:[TGRoup[1]]:DCH[1]|
2|3|4|5|6:BLKSize?
```

This command sets the block size for the selected uplink dedicated channel (DCH).

***RST** DCH1: 244 DCH2: 100 DCH3,4,5,6: 20

Range 0–5000

Key Entry `Blk Size`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:BPFRame

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:
BPFRame?
```

This query returns the number of bits per frame for the selected dedicated transport channel (DCH).

***RST** *DCH1*: 490 *DCH2*: 110 *DCH3–6*: 60

Field Entry `Bits/Frame`

:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:BRATe

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:
BRATe?
```

This query returns the bit rate for the selected dedicated transport channel (DCH)

***RST** *DCH1*: 12200 *DCH2*: 2500 *DCH3–6*: 2000

Range 0–5000

:ULINk:[TGRoup[1]]:DCH[1]|2|3|3|5|6:CODE

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:[TGRoup[1]]:DCH[1]|
2|3|4|5|6:CODE HCONv|TCONv|TURBo|NONE
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:[TGRoup[1]]:DCH[1]|
2|3|4|5|6:CODE?
```

This command sets the encoder type for the uplink dedicated channel (DCH) selected.

HCONv This choice selects a coding with the 1/2 rate convolutional encoder.

TCONv This choice selects a coding with the 1/3 rate convolutional encoder.

TURBo This choice selects a coding with the turbo coder.

NONE This choice selects no coding type.

***RST** DCH1,2: TCONv DCH3,4,5,6: HCONv

Key Entry **1/2 Conv** **1/3 Conv** **Turbo** **NONE**

Remarks If the choice, set by this command, is changed while the signal is active, the apply command must be sent to set the change. See ":ULINk:APPLy" on page 1084.

:ULINk:[TGRoup[1]]:DCH[1]|2|3|3|5|6:CRC

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:[TGRoup[1]]:DCH[1]|
2|3|4|5|6:CRC 0|8|12|16|24
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:[TGRoup[1]]:DCH[1]|
2|3|4|5|6:CRC?
```

This command specifies the number of cyclic redundancy code (CRC) bits to be added to each transport channel block.

***RST** DCH1: 16 DCH2: 12 DCH3,4,5,6: 8

Field Entry `CRC Size`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk:[TGRoup[1]]:DCH[1]|2|3|3|5|6:DATA

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:[TGRoup[1]]:DCH[1]|
2|3|4|5|6:DATA PN9|FIX4|"<file name>"
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:[TGRoup[1]]:DCH[1]|
2|3|4|5|6:DATA?
```

This command configures the data type to be inserted into the selected uplink dedicated channel (DCH).

`"<file name>"` This variable specifies a data pattern that has been stored in memory.

***RST** PN9

Key Entry **PN9** **FIX4** **User File**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:DATA:BER:ACTual

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|
2|3|4|5|6:DATA:BER:ACTual?
```

This query returns the actual inserted error ratio in the uplink dedicated channel (DCH) selected.

***RST** +0.0000000E+000

Remarks The actual bit error rate can be different from the specified bit error rate due to the internal bit generation.

:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:DATA:BER:ERRor:BIT

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:
DATA:BER:ERRor:BIT?
```

This query returns the actual error bits inserted in total number of bits.

***RST** +0

Field Entry `Error Bits`

:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:DATA:BER:TOTal:BIT

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:
DATA:BER:TOTal:BIT?
```

This query returns the total number of bits inserted for the bit error ratio calculation.

***RST** 0

Field Entry `Total Bits`

:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:DATA:BER[:VALue]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:
DATA:BER[:VALue] <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:
DATA:BER[:VALue]?
```

This command specifies the bit error rate (BER) value to be inserted into the selected uplink dedicated channel (DCH). The variable `<val>` is expressed in decimal form as a percent ratio (1.0=100%).

***RST** 0.0000000+000

Range 0.0001–1.0

Field Entry `BER`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:DATA:BLER:ACTual

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|
2|3|4|5|6:DATA:BLER:ACTual?
```

This query returns the actual block error ratio inserted.

***RST** 0.0000000E+000

Remarks The actual block error rate can be different from the specified block error rate due to the internal bit generation.

:ULINk[:TGRoup[1]|2:DCH[1]|2|3|4|5|6:DATA:BLER:ERRor:BLOCk

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]|2:DCH[1]|2|3|4|5|6:
DATA:BLER:ERRor:BLOCk?
```

This query returns the number of error blocks inserted.

***RST** +0

Field Entry `Error Blocks`

:ULINk[:TGRoup[1]|2:DCH[1]|2|3|4|5|6:DATA:BLER:TOTal:BLOCk

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]|2:DCH[1]|2|3|4|5|6:
DATA:BLER:TOTal:BLOCk?
```

This query returns the error blocks actually inserted in total number of blocks.

***RST** +0

Field Entry `Total Blocks`

:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:DATA:BLER[:VALue]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:
DATA:BLER[:VALue] <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:
DATA:BLER[:VALue]?
```

This command specifies the block error rate (BLER) value to be inserted into the selected uplink dedicated channel (DCH).

The variable `<val>` is expressed in decimal form as a percent ratio (1.0=100%).

***RST** +0.00000000E+000

Range 0.0–1.00

Field Entry `BLER`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:DATA:EINSert

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:
DATA:EINSert BLER|BER|NONE
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:
DATA:EINSert?
```

This command selects the error insertion mode.

BLER This choice selects a block error rate (BLER) mode.

BER This choice selects a bit error rate (BER) mode.

NONE This choice selects no BLER or BER mode (no error blocks or bits inserted).

***RST** NONE

Key Entry **BLER** **BER** **None**

:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:DATA:FIX4

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:
DATA:FIX4 <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:
DATA:FIX4?
```

This command sets the 4 bit data pattern for the selected uplink dedicated channel (DCH).

While the variable `<val>` can be entered in binary, hexadecimal, or decimal formats, the query returns only binary values.

***RST** #B0000

Range 0–15

Key Entry **FIX4**

:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:NBLock

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:
NBLock <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:
NBLock?
```

This command specifies the number of transport blocks coded on to the selected dedicated channel (DCH).

***RST** +1

Range 0–4095

Field Entry `Num of Blk`

:ULINk[:TGRoup [1]]:DCH[1]|2|3|4|5|6:PPERcentage

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:
PPERcentage?
```

This query returns the percentage of the total bits removed from or added to the fully coded channel.

The value is returned in the unit of percent and a negative value means repetition.

Field Entry `Puncture`

:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:RMATch

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:
RMATch <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:
RMATch?
```

This command specifies the rate matching parameters of each dedicated channel (DCH) selected.

***RST** DCH1: 2 DCH2: 12 DCH3,4,5,6: 1

Range 1–256

Field Entry `Rate Match Attr`

:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:TTI

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:
TTI 10000|20000|40000|80000
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6:TTI?
```

This command sets the transmission time interval (TTI) period for the dedicated channel (DCH) selected. TTI is the time interval of the amount of data to be transmitted.

The choices are expressed in units of milliseconds (msec) where 20000 = 20 msec.

***RST** DCH1: 20000 DCH2: 40000 DCH3,4,5,6: 10000

Field Entry `TTI`

Remarks The data amount equals the block size (BLKsize) times the number of transport blocks (NBlock).

:ULINk[:TGRoup[1]]:DCH[1]|2|3|4|5|6[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|
2|3|4|5|6[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:DCH[1]|
2|3|4|5|6[:STATe]?
```

This command enables or disables the operating state of the dedicated channel (DCH) selected.

***RST** DCH1,2: 1 DCH3,4,5,6: 0

Key Entry **TrCH State Off On**

:ULINk[:TGRoup[1]]:RACH[1]:BLKSize

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:BLKSize <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:BLKSize?
```

This command sets the transport block size for the random access channel (RACH) coding where the input data is carried.

***RST** +168

Range 0–5000

Field Entry `Blk Size`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk[:TGRoup [1]]:RACH[1]:BPFRame

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:BPFRame?`

This query returns the bits per frame for the selected random access channel (RACH).

***RST** +600

:ULINk[:TGRoup [1]]:RACH[1]:BRATe

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:BRATe?`

This query returns the bit rate for the random access transport channel (RACH).

***RST** +8400

:ULINk[:TGRoup[1]]:RACH[1]:CODE

Supported E4438C with Option 400

`[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:CODE?`

This query returns the type of channel coding for error protection.

***RST** HCON

:ULINk[:TGRoup[1]]:RACH[1]:CRC

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:
CRC 0|8|12|16|24
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:CRC?
```

This command specifies the number of cyclic redundancy code (CRC) bits that are to be added to each transport channel block.

***RST** +16

Field Entry `CRC Size`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk[:TGRoup[1]]:RACH[1]:DATA

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:DATA PN9|
FIX4|"<file name>"
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:DATA?
```

This command sets the type of data to be inserted into the random access channel (RACH).

`"<file name>"` This variable specifies a data pattern that has been stored in memory.

***RST** PN9

Key Entry **PN9** **FIX4** **User File**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk[:TGRoup[1]]:RACH[1]:DATA:BER:ACTual

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:DATA:BER:
ACTual?
```

This query returns the actual error ratio inserted.

***RST** +0

Range 0–5000

Key Entry **Actual BER**

Remarks The specified error ratio and actual ratio will not match when the internal bit generation goes into "pre-computing" mode.

:ULINk[:TGRoup[1]]:RACH[1]:DATA:BER:ERRor:BIT

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:DATA:BER:
ERRor:BIT?
```

This query returns the actual error bits inserted for the total number of bits.

***RST** 0

:ULINk[:TGRoup[1]]:RACH[1]:DATA:BER:TOTal:BIT

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:DATA:BER:
TOTal:BIT?
```

This query returns the total number of bits inserted for the bit error ratio calculation.

***RST** 0

Remarks The specified error ratio and actual ratio will not match when the internal bit generation goes into "pre-computing" mode.

:ULINk[:TGRoup[1]]:RACH[1]:DATA:BER[:VALue]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:DATA:
BER[:VALue] <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:DATA:
BER[:VALue]?
```

This command sets the bit error rate value for the random access channel (RACH).

***RST** +0.00000000E+000

Range 0.0000–1.0

Field Entry BER

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk[:TGRoup[1]]:RACH[1]:DATA:BLER:ACTual

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:DATA:
BLER:ACTual?
```

This query returns the actual error ratio inserted.

***RST** 0.0000000E+000

Remarks The specified error ratio and actual error ratio will not match when the internal bit generation goes into “pre-computing” mode.

:ULINk[:TGRoup[1]]:RACH[1]:DATA:BLER:ERRor:BLOCk

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:DATA:
BLER:ERRor:BLOCk?
```

This query returns the actual block errors inserted in the total number of blocks.

***RST** +0

Remarks The specified error ratio and actual error ratio will not match when the internal bit generation goes into “pre-computing” mode.

:ULINk[:TGRoup[1]]:RACH[1]:DATA:BLER:TOTal:BLOCk

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:DATA:
BLER:TOTal:BLOCk?
```

This query returns the total blocks inserted for the block error ratio calculation.

***RST** +0

Remarks The specified error ratio and actual error ratio will not match when the internal bit generation goes into “pre-computing” mode.

:ULINk[:TGRoup[1]]:RACH[1]:DATA:BLER[:VALue]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:DATA:
BLER[:VALue] <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:DATA:
BLER[:VALue]?
```

This command sets the inserted block error rate value. The variable `<val>` is expressed in decimal form, but it is a percent ratio (1.0=100%).

***RST** 0

Range 0.0001–1.0

Field Entry `BLER`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:ULINk:APPLy” on page 1084.

:ULINk[:TGRoup[1]]:RACH[1]:DATA:EINSert

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:DATA:
EINSert BLER|BER|NONE
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:DATA:EINSert?
```

This command selects an error mode or no error insertion.

BLER This choice selects block error rate (BLER) mode.

BER This choice selects a bit error rate (BER) mode.

NONE This choice selects no BLER or BER mode (no error blocks or bits inserted).

***RST** NONE

Key Entry **BLER** **BER** **None**

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:ULINk:APPLy” on page 1084.

:ULINk[:TGRoup[1]]:RACH[1]:DATA:FIX4

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:DATA:
FIX4 <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:DATA:FIX4?
```

This command sets a fixed 4 bit pattern for use as a data pattern.

While the variable `<val>` can be entered in binary, hexadecimal, or decimal formats, the query returns only binary values.

***RST** #B0000

Range 0–15

Field Entry `Data`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:ULINk:APPLy” on page 1084.

:ULINk[:TGRoup[1]]:RACH[1]:NBLock

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:NBLock <val>
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:NBLock?
```

This command sets the number of transport blocks coded into one random access channel (RACH).

***RST** +1

Range 0–4095

Field Entry `Num of Blk`

Remarks The total input data into one RACH is the block size (BLKsize) multiplied by the number of transport blocks (NBLock).

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084

:ULINk[:TGRoup [1]]:RACH[1]:PPERcentage

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:PPERcentage?
```

This query returns the percentage of the total bits removed from or added to the fully coded channel.

***RST** –2.12500000E+002

Field Entry `Puncture`

:ULINk[:TGRoup[1]]:RACH[1]:RMATch

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk:RACH[1]:RMATch?
```

This query returns the rate match parameters of each random access channel (RACH).

***RST** +1

:ULINk[:TGRoup[1]]:RACH[1]:TTI

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:
TTI 10000|20000
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1]:TTI?
```

This command sets the transmission time interval (TTI) period for the random access channel (RACH).

The choices are expressed in units of milliseconds (msec) where 20000=20 msec.

***RST** 20000

Field Entry `TTI`

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to ":ULINk:APPLy" on page 1084.

:ULINk[:TGRoup[1]]:RACH[1][:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG]:ULINk[:TGRoup[1]]:RACH[1][:STATe]?
```

This query returns the state of the random access channel (RACH).

***RST** 1

[:STATe]

Supported E4438C with Option 400

```
[:SOURce]:RADio:WCDMa:TGPP[:BBG][:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa:TGPP[:BBG][:STATe]?
```

This command enables or disables W-CDMA functionality.

***RST** 0

Key Entry **W-CDMA Off On**

Symbols

Numerics

G

Index

T

U

V

W

Index