MS2830A Signal Analyzer
Vector Signal Generator
Operation Manual
Remote Control

Third Edition

- **For safety and warning information, please read this manual before attempting to use the equipment.**
- **Additional safety and warning information is provided within the MS2830A Signal Analyzer Operation Manual (Mainframe Operation) and the MS2830A Signal Analyzer Vector Signal Generator Option Operation Manual (Operation). Please also refer to these documents before using the equipment.**
- **Keep this manual with the equipment.**

ANRITSU CORPORATION

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Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Corporation uses the following safety symbols to indicate safety-related information. Ensure that you clearly understand the meanings of the symbols BEFORE using the equipment. Some or all of the following symbols may be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.

Symbols used in manual

DANGER This indicates a very dangerous procedure that could result in serious injury or death if not performed properly.

WARNING This indicates a hazardous procedure that could result in serious injury or death if not performed properly.

CAUTION This indicates a hazardous procedure or danger that could result in light-to-severe injury, or loss related to equipment malfunction, if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manual

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions BEFORE using the equipment.

This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.

This indicates an obligatory safety precaution. The obligatory operation is indicated symbolically in or near the circle.

This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.

This indicates a note. The contents are described in the box.

These indicate that the marked part should be recycled.

MS2830A Signal Analyzer
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Operation Manual Remote Control

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Notes On Export Management

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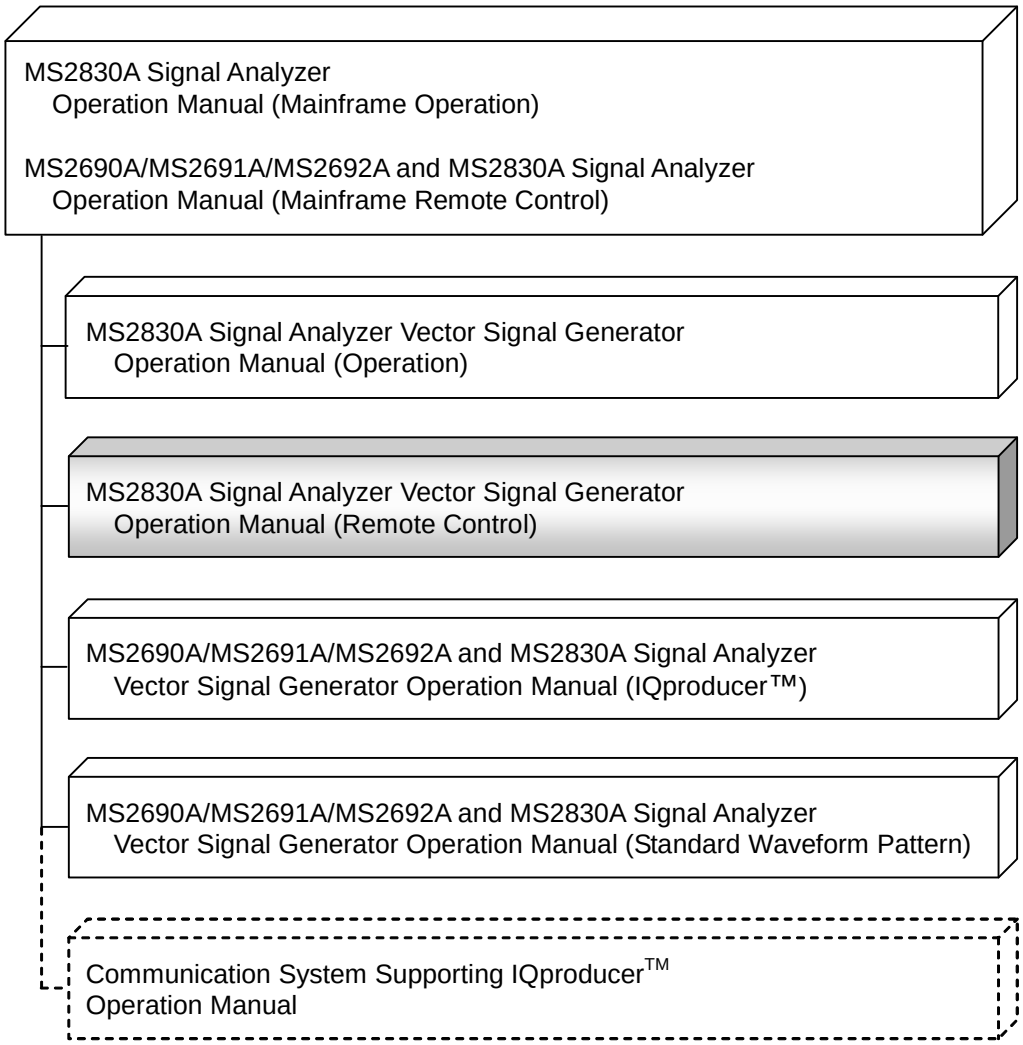
About This Manual

■ **Composition of Operation Manuals**

The operation manuals for the MS2830A Signal Analyzer are comprised as shown in the figure below.



- **Signal Analyzer Operation Manual (Mainframe Operation)**
- **Signal Analyzer Operation Manual (Mainframe Remote Control)**

These manuals describe basic operating methods, maintenance procedures, common functions, and common remote control of the signal analyzer mainframe.

- **Vector Signal Generator Operation Manual (Operation)**

This manual describes functions, operating methods, and so on of the vector signal generator (option).

- **Vector Signal Generator Operation Manual (Remote Control) (This manual)**

This manual describes remote control of the vector signal generator (option).

- **Vector Signal Generator Operation Manual (IQproducer™)**

This manual describes functions, operating methods, and so on of the IQproducer, which is application software used with the vector signal generator (option).

- **Vector Signal Generator Operation Manual (Standard Waveform Pattern)**

This manual describes details on the standard waveform pattern data used with the vector signal generator (option).

Table of Contents

IV.

Chapter 1 Overview

This chapter provides an overview of the remote control of the Spectrum Analyzer function (hereinafter, referred to as “this application”).

1.1 Overview

Automatic measurement can be performed by using this instrument in connection with an external controller (PC). This instrument is standardly equipped with GPIB, Ethernet, and USB interfaces. You can also select a remote control command from the SCPI mode, which is a command format defined by the SCPI Consortium, and Native mode, which is our unique format.

See the "MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer Operation Manual (Mainframe Remote Control)" for how to switch the language mode.

You can use the Native mode by converting SCPI commands into Native ones. See the "MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer Operation Manual (Mainframe Remote Control)" for details.

Chapter 2 SCPI Device Message

This chapter describes the detailed specifications of SCPI remote control commands for executing the functions of this application. The device messages are listed according to function. Refer to the "MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer Operation Manual (Mainframe Remote Control)" for detailed specifications off the IEEE488.2 common device messages and application common device messages.

2.1 Setting Frequency

Table 2.1-1 shows device messages for frequency.

Table 2.1-1 Device messages for frequency

Function	Device Messages
Frequency	[:SOURce]:FREQuency[:CW|:FIXed] <freq>
	[:SOURce]:FREQuency[:CW|:FIXed]?
Frequency Step Value	[:SOURce]:FREQuency:STEP[:INCRement] <numeric_value>
	[:SOURce]:FREQuency:STEP[:INCRement]?
RF Spectrum	[:SOURce]:DM:POLarity[:ALL] NORMal|INVert
	[:SOURce]:DM:POLarity[:ALL]?

2.1.1 Frequency

[:SOURce]:FREQuency[:CW|:FIXed] <freq>

Frequency

Function

Sets frequency

Command

```
[:SOURce]:FREQuency[:CW|:FIXed] <freq>
```

Parameter

`<freq>`		Frequency
	Range	250 kHz to 3.6 GHz (*) 250 kHz to 6 GHz (**)
	Resolution	0.01 Hz
	Default	1 GHz
	Suffix code	`HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ`
	When omitted:	`Hz`

(*) When option 020/120 is installed.
(**) When option 021/121 is installed.

Example of Use

To set the frequency to 800 MHz

```
FREQ 800MHZ
```

[:SOURce]:FREQuency[:CW|:FIXed]?

Frequency Query

Function

This command queries the frequency.

Query

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

Response

```
<freq>
```

Parameter

`<freq>`		Frequency
	Range	250 kHz to 3.6 GHz (*) 250 kHz to 6 GHz (**)
	Resolution	0.01 Hz
	Default	1 GHz

(*) When option 020/120 is installed.
(**) When option 021/121 is installed.

Example of Use

To query the frequency.

```
FREQ?
> 800000000.00
```

2.1.2 Frequency Step Value

[:SOURce]:FREQuency:STEP[:INCRement] <numeric_value>

Frequency - Step Value

Function

This command sets the amount the frequency to be incremented or decremented (frequency step width) when the frequency setting is stepped up or down.

Command

```
[:SOURce]:FREQuency:STEP[:INCRement] <numeric_value>
```

Parameter

<numeric_value>	Frequency step width
Range	0.01 Hz to 1 GHz
Resolution	0.01 Hz
Default	100 kHz
Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ
When omitted:	Hz

Example of Use

To set the frequency step width to 200 kHz.

```
FREQ:STEP 200KHZ
```

[:SOURce]:FREQuency:STEP[:INCRement]?

Frequency - Step Value Query

Function

This command queries the amount the frequency to be incremented or decremented (frequency step width) when the frequency setting is stepped up or down.

Query

```
[:SOURce]:FREQuency:STEP[:INCRement]?
```

Response

```
<numeric_value>
```

Parameter

`<numeric_value>`		Frequency step width
	Range	0.01 Hz to 1 GHz
	Resolution	0.01 Hz
	Default	100 kHz

Example of Use

To query the frequency step width.

```
FREQ:STEP?
> 200000.00
```

2.1.3 RF Spectrum

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

RF Spectrum - Reverse/Normal

Function

This command whether to invert spectrum of the output waveform (reverses I and Q).

Command

```
[:SOURce]:DM:POLarity[:ALL] <mode>
```

Parameter

<mode>	Whether to invert output waveform
NORMal	Normal: Do not invert
INVert	Reverse: Invert

Example of Use

To invert the output waveform.

```
DM:POL INV
```

[:SOURce]:DM:POLarity[:ALL]?

RF Spectrum - Reverse/Normal Query

Function

This command queries the status of the spectrum invert (reverses I and Q) of the output waveform.

Query

```
[:SOURce]:DM:POLarity[:ALL]?
```

Response

```
<mode>
```

Parameter

<mode>	Whether to invert output waveform
NORM	Normal: Do not invert
INV	Reverse: Invert

Example of Use

To query the invert status of the output waveform.

```
DM:POL?
> INV
```

2.2 Setting Level

Table 2.2-1 shows device messages for setting level.

Table 2.2-1 Device messages for level

Function	Device Messages
Output Level Unit	:DISPlay:ANNotation:AMPLitude:UNIT DBM|DBU
	:DISPlay:ANNotation:AMPLitude:UNIT?
Volt Unit Display	:DISPlay:ANNotation:AMPLitude:UNIT:VOLTage EMF|TERM
	:DISPlay:ANNotation:AMPLitude:UNIT:VOLTage?
RF Output	:OUTPut[:STATe] ON|OFF|1|0
	:OUTPut[:STATe]?
Unit Power	:UNIT:POWer DBM|DBUV|DBUVEMF
	:UNIT:POWer?
SG Level Calibration	[:SOURce]:POWer:ALC:SEARch {ONCE}
Relative Level Value	[:SOURce]:POWer:REFerence:AMPLitude <numeric_value>
	[:SOURce]:POWer:REFerence:AMPLitude?
Relative Level	[:SOURce]:POWer:REFerence:STATe ON|OFF|1|0
	[:SOURce]:POWer:REFerence:STATe?
Reference of Relative Level	[:SOURce]:POWer:REFerence?
Level Status List	[:SOURce]:POWer:SETTing?
Level Offset Value	[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet <numeric_value>
	[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet?
Level Offset	[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet:STATe ON|OFF|1|0
	[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet:STATe?
Output Level Step Value	[:SOURce]:POWer[:LEVel][:IMMediate]:STEP[:INCRement] <numeric_value>
	[:SOURce]:POWer[:LEVel][:IMMediate]:STEP[:INCRement]?
Output Level	[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude] <numeric_value>
	[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude]? {<unit>}

2.2.1 Output Level Unit

:DISPlay:ANNotation:AMPLitude:UNIT DBM|DBU

Level Unit

Function

This command sets the output level unit.

Command

```
:DISPlay:ANNotation:AMPLitude:UNIT <unit>
```

Parameter

<unit>	Output level unit
DBM	dBm
DBU	dBμV

Example of Use

To set the level setting unit to dBm.

```
DISP:ANN:AMPL:UNIT DBM
```

:DISPlay:ANNotation:AMPLitude:UNIT?

Level Unit Query

Function

This command queries the output level unit.

Query

```
:DISPlay:ANNotation:AMPLitude:UNIT?
```

Response

```
<unit>
```

Parameter

<unit>	Output level unit
DBM	dBm
DBU	dBμV

Example of Use

To query the level setting unit.

```
DISP:ANN:AMPL:UNIT?
> DBM
```

2.2.2 Volt Unit Display

:DISPlay:ANNotation:AMPLitude:UNIT:VOLTage EMF|TERM

Volt Unit

Function

This command sets the display method when the output level is set in voltage units.

Command

```
:DISPlay:ANNotation:AMPLitude:UNIT:VOLTage <unit>
```

Parameter

<unit>	Voltage unit display system
EMF	Open circuit voltage display
TERM	Termination voltage display

Example of Use

To display the voltage units using open voltage.

```
DISP:ANN:AMPL:UNIT:VOLT EMF
```

:DISPlay:ANNotation:AMPLitude:UNIT:VOLTage?

Volt Unit Query

Function

This command queries the display method when the output level is set in voltage units.

Query

```
:DISPlay:ANNotation:AMPLitude:UNIT:VOLTage?
```

Response

```
<unit>
```

Parameter

<unit>	Voltage unit display system
EMF	Open circuit voltage display
TERM	Termination voltage display

Example of Use

To query the voltage unit display system

```
DISP:ANN:AMPL:UNIT:VOLT?
> EMF
```

2.2.3 RF Output

:OUTPut[:STATe] ON|OFF|1|0

RF Output - On/Off

Function

This command turns RF output ON/OFF.

Command

```
:OUTPut[:STATe] <on_off>
```

Parameter

`<on_off>`	RF output On/Off
`ON|1`	On
`OFF|0`	Off

Example of Use

To set the RF signal output to Off.

```
OUTP OFF
```

:OUTPut[:STATe]?

RF Output - On/Off Query

Function

This command queries the ON/OFF status of RF output.

Query

```
:OUTPut[:STATe]?
```

Response

```
<on_off>
```

Parameter

`<on_off>`	RF output On/Off
`ON|1`	On
`OFF|0`	Off

Example of Use

To query the ON/OFF status of RF output.

```
OUTP?
> 1
```

2.2.4 Unit Power

:UNIT:POWer DBM|DBUV|DBUVEMF

Unit Power

Function

This command sets the output level unit.

Command

```
:UNIT:POWer <unit>
```

Parameter

<unit>	Output level unit
DBM	dBm
DBUV	dBμV (terminal voltage display)
DBUVEMF	dBμV (open voltage display)

Example of Use

To set the level setting unit to dBμV (open voltage display).

```
UNIT:POW DBUVEMF
```

:UNIT:POWer?

Unit Power Query

Function

This command queries the output level unit.

Query

```
:UNIT:POWer?
```

Response

```
<unit>
```

Parameter

<unit>	Output level unit
DBM	dBm
DBUV	dBμV (terminal voltage display)
DBUVEMF	dBμV (open voltage display)

Example of Use

To query the level setting unit.

```
UNIT:POW?
> DBM
```

2.2.5 SG Level Calibration

[:SOURce]:POWer:ALC:SEARch {ONCE}

SG Level Calibration

Function

This command calibrates the output level.

Command

```
[:SOURce]:POWer:ALC:SEARch {ONCE}
```

Example of Use

To calibrate the output level.

```
POW:ALC:SEAR
```

2.2.6 Relative Level Value

[:SOURce]:POWer:REFerence:AMPLitude <numeric_value>

Relative Level

Function

This command sets the screen display output level at relative output level display mode.

Command

```
[:SOURce]:POWer:REFerence:AMPLitude <numeric_value>
```

Parameter

<numeric_value> Relative output level

Range	60 dB width within the range of –60.00 dB to +60.00 dB (> 25 MHz)(*) 42 dB width within the range of –42.00 dB to +42.00 dB (≤ 25 MHz)(*) 151 dB width within the range of –151.00 dB to +151.00 dB (> 25 MHz)(**) 133 dB width within the range of –133.00 dB to +133.00 dB (≤ 25 MHz)(**)
Resolution	0.01 dB
Response unit	dB

(*) When option 022/122 is NOT installed.

(**) When option 022/122 is installed.

Details

The range differs as follows according to the conditions:

When Offset is on: Range + Offset Value

Example of Use

To set the relative output to +10.00 dB.

```
POW:REF:AMPL 10.00DB
```

[:SOURce]:POWer:REFerence:AMPLitude?

Relative Level Query

Function

This command queries the screen display output level at relative output level display mode.

Query

```
[:SOURce]:POWer:REFerence:AMPLitude?
```

Response

```
<numeric_value>
```

Parameter

`<numeric_value>` Relative output level

Range	60 dB width within the range of –60.00 dB to +60.00 dB (> 25 MHz)(*) 42 dB width within the range of –42.00 dB to +42.00 dB (≤ 25 MHz)(*) 151 dB width within the range of –151.00 dB to +151.00 dB (> 25 MHz)(**) 133 dB width within the range of –133.00 dB to +133.00 dB (≤ 25 MHz)(**)
Resolution	0.01 dB
Response unit	dB

(*) When option 022/122 is NOT installed.

(**) When option 022/122 is installed.

Details

The range differs as follows according to the conditions:

When Offset is on: Range + Offset Value

Example of Use

To query the relative output level.

```
POW:REF:AMPL?
> 10.00
```

2.2.7 Relative Level

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

Relative - On/Off

Function

This command sets the relative output level display ON/OFF.

Command

```
[:SOURce]:POWer:REFerence:STATe <on_off>
```

Parameter

<on_off>	Relative output level display
ON|1	On
OFF|0	Off

Example of Use

To enable relative output level display.

```
POW:REF:STAT ON
```

[:SOURce]:POWer:REFerence:STATe?

Relative - On/Off Query

Function

This command queries the relative output level display ON/OFF status.

Query

```
[:SOURce]:POWer:REFerence:STATe?
```

Response

```
<on_off>
```

Parameter

<on_off>	Relative output level display
1	On
0	Off

Example of Use

To query the relative output level display ON/OFF status.

```
POW:REF:STAT?
> 1
```

2.2.8 Reference of Relative Level

[:SOURce]:POWer:REFerence?

Relative Level - Reference Level Query

Function

This command queries the relative output level in the relative output level display mode (the output level when relative output mode is on).

Query

```
[:SOURce]:POWer:REFerence?
```

Response

```
<numeric_value>
```

Parameter

`<numeric_value>`		Reference level of relative output
	Range	−40.00 dBm to +20.00 dBm (>25 MHz)(*) −40.00 dBm to +2.00 dBm (≤25 MHz)(*) −136.00 dBm to +15.00 dBm (>25 MHz)(**) −136.00 dBm to –3.00 dBm (≤25 MHz)(**)
	Resolution	0.01 dB
	Response unit	dBm

(*) When option 022/122 is NOT installed.

(**) When option 022/122 is installed.

Details

The range is based on an output level unit of dBm.

The range differs as follows according to the conditions:

When dBμV (Term) is set as the output level unit

Range + 106.99 dB

When dBμV (EMF) is set as the output level unit

Range + 113.01 dB

When Offset is on: Range + Offset Value

Example of Use

To query reference level of relative output

```
POW:REF?
> -5.00
```

2.2.9 Level Status List

[:SOURce]:POWer:SETTing?

Level Status List Query

Function

This command queries the output level status.

Query

```
[:SOURce]:POWer:SETTing?
```

Response

```
<unit>,<offset>,<unleveled>,INT,0,
<relative>,NORM
```

Parameter

`<unit>`	Voltage unit display
`EMF`	Open circuit voltage
`TERM`	Termination voltage
`<offset>`	Level offset
`1`	On
`0`	Off
`<unleveled>`	Output level accuracy status
`NORM`	Normal state
`UNL`	Outside level accuracy assurance
`INT`	Fixed value
Fixed value`<relative>`	Relative output mode
`1`	On
`0`	Off

Fixed valueExample of Use

To query the output level status.

```
POW:SETT?
> EMF,0,NORM,1,0
```

2.2.10 Level Offset Value

[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet <numeric_value>

Level Offset - Level

Function

This command sets the output level offset value

Command

```
[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet
<numeric_value>
```

Parameter

`<numeric_value>`		Output level offset
	Range	–100.00 to +100.00 dB
	Resolution	0.01 dB
	Default	0.00 dB

Example of Use

To set the output level offset to –15.00 dB.

```
POW:OFFS –15.00
```

[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet?

Level Offset - Level Query

Function

This queries the output level offset.

Query

```
[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet?
```

Response

```
<numeric_value>
```

Parameter

`<numeric_value>`		Output level offset
	Range	–100.00 to +100.00 dB
	Resolution	0.01 dB

Example of Use

To query the output level offset.

```
POW:OFFS?
> –5.00
```

2.2.11 Level Offset

[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet:STATe ON|OFF|1|0

Level Offset - On/Off

Function

This command sets the output level offset ON/OFF.

Command

```
[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet:STATe <on_off>
```

Parameter

<on_off>	Output level offset On/Off
ON|1	On
OFF|0	Off

Example of Use

To enable the output level offset.

```
POW:OFFS:STAT ON
```

[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet:STATe?

Level Offset - On/Off Query

Function

This command queries the output level offset ON/OFF status.

Query

```
[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet:STATe?
```

Response

```
<on_off>
```

Parameter

<on_off>	Output level offset On/Off
1	On
0	Off

Example of Use

To query the output level offset ON/OFF status.

```
POW:OFFS:STAT?
> 1
```

2.2.12 Output Level Step Value

[:SOURce]:POWer[:LEVel][:IMMediate]:STEP[:INCRement] <numeric_value>

Output Level - Set Value

Function

This command sets the numerical value fluctuation width (step value) when the output level is increased/decreased in step units.

Command

```
[:SOURce]:POWer[:LEVel][:IMMediate]:STEP[:INCRement]
<numeric_value>
```

Parameter

`<numeric_value>`		Output level step width
	Range	0.01 to 100.00 dB
	Resolution	0.01 dB

Example of Use

To set the output level step width to 5.00 dB.

```
POW:STEP 5.00
```

[:SOURce]:POWer[:LEVel][:IMMediate]:STEP[:INCRement]?

Output Level - Set Value Query

Function

This command queries the numerical value fluctuation width (step value) when the output level is increased/decreased in step units.

Query

```
[:SOURce]:POWer[:LEVel][:IMMediate]:STEP[:INCRement]?
```

Response

```
<numeric_value>
```

Parameter

`<numeric_value>`		Output level step width
	Range	0.01 to 100.00 dB
	Resolution	0.01 dB

Example of Use

To query the step width of the output level.

```
POW:STEP?
> 0.10
```

2.2.13 Output Level

[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude] <numeric_value>

Output Level

Function

This command sets the output level.

Command

```
[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude]
<numeric_value>
```

Parameter

<numeric_value>	Output Level
Range	−40.00 dBm to +20.00 dBm (>25 MHz)(*)
	−40.00 dBm to +2.00 dBm (≤25 MHz)(*)
	−136.00 dBm to +15.00 dBm (>25 MHz) (**)
	−136.00 dBm to –3.00 dBm (≤25 MHz) (**)
Resolution	0.01 dB
Default	−40.00 dBm (*)
	−136.00 dBm (**)
Suffix code	DBM, DBU
When omitted:	DBM

(*) When option 022/122 is NOT installed.

(**) Details of when option 022/122 is installed.

The range is based on an output level unit of dBm.

The set range differs as follows according to the setting conditions:

When dBμV (Term) is set as the output level unit

Range + 106.99 dB

When dBμV (EMF) is set as the output level unit

Range + 113.01 dB

When Offset is on: Range + Offset Value

Example of Use

To set the output level to –30.00 dBm

```
POW –30.00
```

[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude]? {<unit>}

Output Level Query

Function

This command queries the output level.

Query

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

Response

```
<numeric_value>
```

Parameter

`<numeric_value>`		Output Level
	Range	–40.00 dBm to +20.00 dBm (>25 MHz)(*) –40.00 dBm to +2.00 dBm (≤25 MHz)(*) –136.00 dBm to +15.00 dBm (>25 MHz) (**) –136.00 dBm to –3.00 dBm (≤25 MHz) (**)
	Resolution	0.01 dB
	Response unit	dBm or dBμV (according to the set value)

(*) When option 022/122 is NOT installed.

(**) When option 022/122 is installed.

`<unit>`		Output level unit
	`DBM`	dBm
	`DBU`	dBμV
	When omitted:	dBm

Details

The range is based on an output level unit of dBm.

The range differs as follows according to the conditions:

When dBμV (Term) is specified as the output level unit

Range + 106.99 dB

When dBμV (EMF) is specified as the output level unit

Range + 113.01 dB

When Offset is on: Range + Offset Value

Example of Use

To query the output level in dBm.

```
POW? DBM
> -30.00
```

2.3 Controlling Waveform Patterns in Waveform Memory

Table 2.3-1 shows the device messages for controlling waveform patterns loaded into the waveform memory.

Table 2.3-1 Device messages for controlling waveform patterns loaded into the waveform memory

Function	Device Message
Delete Pattern file on Wave Memory	`:MEMory:DELete[:NAME] <package>,<pattern>`
Delete All Pattern files on Wave Memory (Clear Wave Memory)	`:MEMory:DELete:ALL`
List of Loaded Pattern Files	`:MEMory:WAVeform:NAME? <numeric_value>`
Number of loaded pattern files	`:MEMory:WAVeform:COUNt?`
Wave Memory Size	`:MEMory:FREE[:ALL]?`
Select Pattern file on Wave Memory	`[:SOURce]:RADio:ARB:WAVeform <package>,<pattern>`
	`[:SOURce]:RADio:ARB:WAVeform?`
Waveform Restart	`[:SOURce]:RADio:ARB:WAVeform:RESTart`
ARB Status Query	`[:SOURce]:RADio:ARB:REGister[:STATus]?`

2.3.1 Delete Pattern file on Wave Memory

:MEMory:DELete[:NAME] <package>,<pattern>

Delete Pattern file on Waveform Memory

Function

This command deletes the waveform pattern file in the waveform memory.

Command

```
:MEMory:DELete[:NAME] <package>,<pattern>
```

Parameter

<package>	Package name (Character string)
<pattern>	Pattern name (Character string)

Details

This command does not delete waveform patterns on the hard disk.

Example of Use

To delete the "TEST" pattern in the package "WCDMA".

```
MEM:DEL "WCDMA","TEST"
```

2.3.2 Delete All Pattern files on Wave Memory

:MEMory:DELete:ALL

Delete Pattern file on Waveform Memory

Function

This command deletes all waveform pattern files in the waveform memory.

Command

```
:MEMory:DELete:ALL
```

Details

This command does not delete waveform patterns on the hard disk.

Example of Use

To delete all waveform pattern files in the waveform memory.

```
MEM:DEL:ALL
```

2.3.3 List of Loaded Pattern Files

:MEMory:WAVeform:NAME? <numeric_value>

Loaded File Name in Waveform Memory Query

Function

This command queries the waveform pattern filename loaded in the waveform memory.

Query

```
:MEMory:WAVeform:NAME? <numeric_value>
```

Response

```
<package>,<pattern>
```

Parameter

<numeric_value>		Random numbers allocated to waveform patterns.
	Range	0 to (Number of waveform patterns in the waveform memory − 1)
	Resolution	1
<package>		Package name (Character string)
<pattern>		Pattern name (Character string)

Example of Use

To query the waveform pattern filename loaded in the waveform memory.

```
MEM:WAV:NAME? 2
> "WCDMA","TEST"
```

2.3.4 Number of loaded pattern files

:MEMory:WAVeform:COUNt?

Number of Loaded Files Query

Function

This command queries the number of waveform pattern files loaded in the waveform memory.

Query

```
:MEMory:WAVeform:COUNt?
```

Response

<n>

Parameter

<n>		Number of waveform pattern files loaded to waveform memory
	Range	0 to 4096
	Resolution	1

Example of Use

To query the number of waveform pattern files loaded in the waveform memory.

```
MEM:WAV:COUN?
> 2
```

2.3.5 Wave Memory Size

:MEMory:FREE[:ALL]?

Waveform Memory Space Query

Function

This command queries the waveform memory free space.

Query

```
:MEMory:FREE[:ALL]?
```

Response

```
<blank>,<consecutive_blank>,<total>
```

Parameter

`<blank>`	Free space (in byte)
`<consecutive_blank>`	Contiguous free space (in byte)
`<total>`	Total waveform memory size (in byte)

Example of Use

To query the waveform memory free space.

```
MEM:FREE?
```

2.3.6 Select Pattern file on Wave Memory

[:SOURce]:RADio:ARB:WAVeform <package>,<pattern>

Select Waveform File

Function

This selects the waveform pattern file to be played from the waveform pattern files loaded to the waveform memory.

Command

```
[:SOURce]:RADio:ARB:WAVeform <package>,<pattern>
```

Parameter

`<package>`	Package name (Character string)
`NONE`	Waveform pattern file not selected
`<pattern>`	Pattern name (Character string)
`NONE`	Waveform pattern file not selected

Example of Use

To select the "TEST" pattern in the package "WCDMA".

```
RAD:ARB:WAV "WCDMA","TEST"
```

[:SOURce]:RADio:ARB:WAVeform?

Select Waveform File Query

Function

This command queries the waveform pattern file to be played.

Query

```
[:SOURce]:RADio:ARB:WAVeform?
```

Response

```
<package>,<pattern>
```

Parameter

`<package>`	Package name (Character string)
`NONE`	Waveform pattern file not selected
`<pattern>`	Pattern name (Character string)
`NONE`	Waveform pattern file not selected

Example of Use

To query the waveform pattern file to be played.

```
RAD:ARB:WAV?
> "WCDMA","TEST"
```

2.3.7 Waveform Restart

[:SOURce]:RADio:ARB:WAVeform:RESTart

Waveform Restart

Function

This command plays waveform pattern from the beginning.

Command

```
[:SOURce]:RADio:ARB:WAVeform:RESTart
```

Example of Use

To play waveform pattern from the beginning.

```
RAD:ARB:WAV:REST
```

2.3.8 ARB Status Query

[:SOURce]:RADio:ARB:REGister[:STATus]?

ARB Status Query

Function

This command queries the waveform memory status.

Query

```
[:SOURce]:RADio:ARB:REGister[:STATus]?
```

Response

```
<status>
```

Parameter

`<status>` Waveform memory status

Value = bit0 + bit1 + bit2 + bit3 + bit4 + bit5 + bit6 + bit7 + bit8 + bit9 + bit10 + bit11 + bit12 + bit13 + bit14 + bit15

The bit assignments are as follows:

bit0 : 2^0 = 1	(Not used)
bit1 : 2^1 = 2	(Not used)
bit2 : 2^2 = 4	Waveform patter playback status: (0: Paused, 1: Play)
bit3 : 2^3 = 8	(Not used)
bit4 : 2^4 = 16	(Not used)
bit5 : 2^5 = 32	(Not used)
bit6 : 2^6 = 64	(Not used)
bit7 : 2^7 = 128	(Not used)
bit8 : 2^8 = 256	(Not used)
bit9 : 2^9 = 512	(Not used)
bit10 : 2^{10} = 1024	(Not used)
bit11 : 2^{11} = 2048	(Not used)
bit12 : 2^{12} = 4096	(Not used)
bit13 : 2^{13} = 8192	(Not used)
bit14 : 2^{14} = 16384	(Not used)
bit15 : 2^{15} = 32768	(Not used)

Range 0 to 65535

Example of Use

To query the waveform memory status.

```
RAD:ARB:REG?
> 4
```

2.4 Controlling Waveform Patterns in HDD

Table 2.4-1 shows the device messages for controlling waveform patterns in the hard disk.

Table 2.4-1 Device messages for controlling waveform patterns in the hard disk

Function	Device Messages
Copy pattern file to Hard Disk Drive	`:MMEMory:COPY <device>[,<package>]`
Delete Pattern file on Hard Disk Drive	`:MMEMory:DELete[:NAME] <package>,<pattern>`
Load Pattern File / Query Load Status and Wave Memory	`:MMEMory:LOAD:WAVeform <package>,<pattern>`
	`:MMEMory:LOAD:WAVeform? <package>,<pattern>`
Cancel Loading	`:MMEMory:LOAD:WAVeform:ABORt`
Pattern File Version	`:MMEMory:WAVeform:VERSion? <package>,<pattern>`
Hard Disk Drive Size	`:MMEMory:WAVeform:FREE[:ALL]?`

2.4.1 Copy pattern file to Hard Disk Drive

:MMEMory:COPY <device>[,<package>]

Copy pattern file to Hard Disk Drive

Function

This command copies the waveform pattern file from the specified drive to the internal hard disk drive. Specify a waveform pattern by a package name, which is the name of the folder that stores the waveform pattern file.

Command

```
:MMEMory:COPY <device>[,<package>]
```

Parameter

<device>	Copy source drive name (A, B, D to Z, D when omitted)
<package>	Copy source package name (character string) or, ROOT

Details

An error occurs when the specified drive or waveform pattern file cannot be found.

When the package name (package) is omitted, all the packages in the root folder of the specified drive will be copied.

When ROOT is specified for <package>, all the patterns in the root folder of the specified drive will be copied.

Example of Use

To copy the waveform pattern in the package "WCDMA" of Drive D to the internal hard disk.

```
MMEM:COPY D,"WCDMA"
```

2.4.2 Delete Pattern file on Hard Disk Drive

:MMEMory:DELete[:NAME] <package>,<pattern>

Delete Pattern file on Hard Disk Drive

Function

This command deletes the waveform pattern file on the hard disk.

Command

```
:MMEMory:DELete[:NAME] <package>,<pattern>
```

Parameter

`<package>`	Package name (Character string)
`<pattern>`	Pattern name (Character string)

Details

This command does not delete waveform patterns in the waveform memory.

Example of Use

To delete the "TEST" pattern in the package "WCDMA".

```
MMEM:DEL "WCDMA","TEST"
```

2.4.3 Load Pattern File / Query Load Status and Wave Memory

:MMEMory:LOAD:WAVeform <package>,<pattern>

Load Pattern File/Check Status of Lading Pattern and Waveform Memory

Function

This command starts loading the waveform pattern from the hard disk to the waveform memory.

Command

```
:MMEMory:LOAD:WAVeform <package>,<pattern>
```

Parameter

`<package>`	Package name (Character string)
`<pattern>`	Pattern name (Character string)

Details

If a waveform pattern is loaded when the same waveform pattern has already been loaded, the existing waveform pattern is overwritten.

Example of Use

To start loading “TEST” pattern in package “WCDMA”.

```
MMEM:LOAD:WAV "WCDMA","TEST"
*OPC?                                   // Loaded when 1 is returned
```

:MMEMory:LOAD:WAVeform? <package>,<pattern>

Load Pattern File/Check Status of Lading Pattern and Waveform Memory Query

Function

Loaded results and current status for the specified waveform pattern are returned in response to the query.

Query

```
:MMEMory:LOAD:WAVeform? <package>,<pattern>
```

Response

```
<status>
```

Parameter

`<package>`	Package name (Character string)
`<pattern>`	Pattern name (Character string)
`<status>`	Status
`0`	Already loaded
`1`	Can be loaded
`2`	License required
`3`	No corresponding file
`4`	Insufficient waveform memory free space
`5`	Internal error
`6`	Version mismatch
`7`	Pattern file analysis error
`8`	Illegal pattern file (.wvi)
`9`	Exceeded number of loadable waveform pattern files
`10`	Exceeded number of loadable packages
`11`	Exceeded number of loadable waveform pattern files in 1 package

Example of Use

To start the current status of "TEST" pattern in package"WCDMA".

```
MMEM:LOAD:WAV? "WCDMA","TEST"
> 1                                   // Can be loaded
```

2.4.4 Cancel Loading

:MMEMory:LOAD:WAVeform:ABORt

Cancel Loading

Function

This command cancels loading waveform patterns to waveform memory.

Command

```
:MMEMory:LOAD:WAVeform:ABORt
```

Example of Use

To cancel loading waveform patterns to waveform memory.

```
MMEM:LOAD:WAV:ABOR
```

2.4.5 Pattern File Version

:MMEMory:WAVeform:VERSion? <package>,<pattern>

File Version Query

Function

This command queries the waveform pattern file version on the hard disk.

Query

```
:MMEMory:WAVeform:VERSion? <package>,<pattern>
```

Response

```
<version>
```

Parameter

`<package>`	Package name (Character string)
`<pattern>`	Pattern name (Character string)
`<version>`	Version number

Example of Use

To query the "TEST" pattern version number of the package "WCDMA".

```
MMEM:WAV:VERS? "WCDMA","TEST"
> 1.00
```

2.4.6 Hard Disk Drive Size

:MMEMory:WAVeform:FREE[:ALL]?

Hard Disk Drive Size Query

Function

This command queries hard disk free space information.

Query

```
:MMEMory:WAVeform:FREE[:ALL]?
```

Response

```
<total>,<blank>
```

Parameter

`<total>`		Total hard disk size
	Response unit	Byte
`<blank>`		Hard disk free space
	Response unit	Byte

Example of Use

To query the hard disk size.

```
MMEM:WAV:FREE?
> 1234567890,123456789
```

2.5 Modulation and AWGN Settings

Table 2.5-1 shows device messages for setting modulation and AWGN.

Table 2.5-1 Device messages for setting modulation and AWGN

Function	Device Messages
Modulation	:OUTPut:MODulation[:STATe] ON|OFF|1|0
	:OUTPut:MODulation[:STATe]?
AWGN	[:SOURce]:RADio:ARB:NOISe[:STATe] ON|OFF|1|0
	[:SOURce]:RADio:ARB:NOISe[:STATe]?
C/N Ratio	[:SOURce]:RADio:ARB:NOISe:CN <numeric_value><unit>
	[:SOURce]:RADio:ARB:NOISe:CN?
Target of C/N Setting	[:SOURce]:RADio:ARB:NOISe:CN:TARGet CARRier|NOISe|CONStant
	[:SOURce]:RADio:ARB:NOISe:CN:TARGet?
Carrier Power	[:SOURce]:RADio:ARB:NOISe:CPOWer <numeric_value><unit>
	[:SOURce]:RADio:ARB:NOISe:CPOWer?
Sampling Clock	[:SOURce]:RADio:ARB:SCLock:RATE?

2.5.1 Modulation

:OUTPut:MODulation[:STATe] ON|OFF|1|0

Modulation - On/Off

Function

This command sets the modulation function ON/OFF.

Command

```
:OUTPut:MODulation[:STATe] <on_off>
```

Parameter

<on_off>	Modulation ON/OFF
ON|1	On
OFF|0	Off

Details

Fixed to OFF when no waveform pattern file is selected.

Example of Use

To set the modulation function to ON.

```
OUTP:MOD ON
```

:OUTPut:MODulation[:STATe]?

Modulation - On/Off Query

Function

This command queries the modulation ON/OFF status.

Query

```
:OUTPut:MODulation[:STATe]?
```

Response

```
<on_off>
```

Parameter

<on_off>	Modulation ON/OFF
1	On
0	Off

Details

Fixed to OFF when no waveform pattern file is selected.

Example of Use

To query the modulation ON/OFF status.

```
OUTP:MOD?
> 1
```

2.5.2 AWGN

[:SOURce]:RADio:ARB:NOISe[:STATe] ON|OFF|1|0

AWGN

Function

This command turns AWGN output ON/OFF.

Command

```
[:SOURce]:RADio:ARB:NOISe[:STATe] <on_off>
```

Parameter

<on_off>	AWGN output On/Off
ON|1	On
OFF|0	Off

Details

Outputs a signal with AWGN added when AWGN is ON.
The AWGN output function can be set to ON or OFF only when a waveform pattern file is selected and the modulation is enabled (ON).

The AWGN output function is automatically set to OFF when a waveform pattern is changed.

Example of Use

To add AWGN to output signal.

```
RAD:ARB:NOIS ON
```

[:SOURce]:RADio:ARB:NOISe[:STATe]?

AWGN Query

Function

This command queries the AWGN output ON/OFF status.

Query

```
[:SOURce]:RADio:ARB:NOISe[:STATe]?
```

Response

```
<on_off>
```

Parameter

<on_off>	AWGN output On/Off
1	On
0	Off

Example of Use

To query the ON/OFF status of the AWGN output signal.

```
RAD:ARB:NOIS?
> 1
```

2.5.3 C/N Ratio

[:SOURce]:RADio:ARB:NOISe:CN <numeric_value>

Power Ratio

Function

This command sets the output ratio of AWGN to carrier (C/N) when AWGN is ON.

Command

```
[:SOURce]:RADio:ARB:NOISe:CN <numeric_value>
```

Parameter

<numeric_value>	C/N
Range	–40 to +40 dB
Resolution	0.01
Default	–40.00

Details

The setting range may be narrowed if the RF output level is close to the upper or lower limit.

Example of Use

To set the C/N to 3 dB.

```
RAD:ARB:NOIS:CN 3DB
```

[:SOURce]:RADio:ARB:NOISe:CN?

Power Ratio Query

Function

This command queries the output ratio of AWGN to carrier (C/N) when AWGN is ON.

Query

```
[:SOURce]:RADio:ARB:NOISe:CN?
```

Response

```
<numeric_value>
```

Parameter

`<numeric_value>`	C/N	
Range	–40 to ＋40 dB	
Resolution	0.01	
Default	–40.00	

Example of Use

To query C/N.

```
RAD:ARB:NOIS:CN?
> -3.00
```

2.5.4 Target of C/N Setting

[:SOURce]:RADio:ARB:NOISe:CN:TARGet CARRier|NOISe|CONStant

Target of C/N Setting

Function

This command sets the parameters to be changed when C/N is set.

Command

```
[:SOURce]:RADio:ARB:NOISe:CN:TARGet <target>
```

Parameter

`<target>`	Parameter to be changed when C/N is set.
`CARRier`	Carrier signal
`NOISe`	NOISE
`CONStant`	Fixed output level (Carrier + AWGN)

Example of Use

To set AWGN as the parameter to be changed when C/N is set.

```
RAD:ARB:NOIS:CN:TARG NOIS
```

[:SOURce]:RADio:ARB:NOISe:CN:TARGet?

Target of C/N Setting Query

Function

This command queries the parameters to be changed when C/N is set.

Query

```
[:SOURce]:RADio:ARB:NOISe:CN:TARGet?
```

Response

```
<target>
```

Parameter

`<target>`	Parameter to be changed when C/N is set.
`CARR`	Carrier signal
`NOIS`	NOISE
`CONS`	Fixed output level (Carrier + AWGN)

Example of Use

To query the parameters to be changed when C/N is set.

```
RAD:ARB:NOIS:CN:TARG?
> NOIS
```

2.5.5 Carrier Power

[:SOURce]:RADio:ARB:NOISe:CPOWer <numeric_value>

Carrier Power

Function

This command sets the carrier signal level when AWGN is ON.

Command

```
[:SOURce]:RADio:ARB:NOISe:CPOWer <numeric_value>
```

Parameter

`<numeric_value>`	Carrier signal level when AWGN is ON.	
	Range	
	Resolution	0.01 dB
	Suffix code	DB

Example of Use

To set the carrier signal level when AWGN is ON to –55.0 dBm.

```
RAD:ARB:NOIS:CPOW -55
```

[:SOURce]:RADio:ARB:NOISe:CPOWer?

Carrier Power Query

Function

This command queries the carrier signal level when AWGN is ON.

Query

```
[:SOURce]:RADio:ARB:NOISe:CPOWer?
```

Response

```
<numeric_value>
```

Parameter

`<numeric_value>`	Carrier signal level when AWGN is ON.	
	Range	
	Resolution	0.01 dB

Example of Use

To query the carrier signal level when AWGN is ON.

```
RAD:ARB:NOIS:CPOW?
> -10.00
```

2.5.5 Sampling Clock

[:SOURce]:RADio:ARB:SCLock:RATE?

Sampling Clock Query

Function

This command queries the baseband signal sampling clock.

Query

```
[:SOURce]:RADio:ARB:SCLock:RATE?
```

Response

```
<numeric_value>
```

Parameter

`<numeric_value>`	Sampling clock	
	Range	0.02 to 160 MHz
	Resolution	0.001 Hz

Example of Use

To query the sampling clock

```
RAD:ARB:SCL:RATE?
> 80000000.000
```

2.6 External In/Output Settings

Table 2.6-1 shows device messages for setting external in/output signals.

Table 2.6-1 Device messages for setting external input signals

Function	Device Messages
Pulse Modulation Source	[:SOURce]:RADio:ARB:PULM:SOURce INTernal|EXTernal|OFF
	[:SOURce]:RADio:ARB:PULM:SOURce?
External Trigger Mode	[:SOURce]:RADio:ARB:TRIGger:TYPE STARt|FRAMe
	[:SOURce]:RADio:ARB:TRIGger:TYPE?
External Trigger	[:SOURce]:RADio:ARB:TRIGger[:STATe] ON|OFF|0|1
	[:SOURce]:RADio:ARB:TRIGger[:STATe]?
External Trigger Source	[:SOURce]:RADio:ARB:TRIGger:SOURce EXTernal|KEY|BUS
	[:SOURce]:RADio:ARB:TRIGger:SOURce?
External Trigger Delay	[:SOURce]:RADio:ARB:TRIGger:DELay <numeric_value>
	[:SOURce]:RADio:ARB:TRIGger:DELay?
External Trigger Delay Time	[:SOURce]:RADio:ARB:TRIGger:DELay:TIME?
External Trigger Edge	[:SOURce]:RADio:ARB:TRIGger:SLOPe POSitive|NEGative
	[:SOURce]:RADio:ARB:TRIGger:SLOPe?
Baseband Reference Clock Source	[:SOURce]:RADio:ARB:CLOCk:REFerence[:SOURce] INTernal|TTL|AC
	[:SOURce]:RADio:ARB:CLOCk:REFerence[:SOURce]?
Baseband Reference Clock	[:SOURce]:RADio:ARB:CLOCk:REFerence:DIVision SIXTeenth|EIGHth|QUARter|HALF|1|2|4|8|16
	[:SOURce]:RADio:ARB:CLOCk:REFerence:DIVision?
Frame Count	[:SOURce]:RADio:ARB:TRIGger:FRAMe:COUNt <integer>
	[:SOURce]:RADio:ARB:TRIGger:FRAMe:COUNt?
Remote Command Trigger	[:SOURce]:RADio:ARB:TRIGger:GENerate

2.6.1 Pulse Modulation Source

[:SOURce]:RADio:ARB:PULM:SOURce INTernal|EXTernal|OFF

Pulse Modulation Source

Function

This command sets the pulse modulation signal source.

Command

```
[:SOURce]:RADio:ARB:PULM:SOURce <source>
```

Parameter

<source>	Pulse modulation signal source.
INTernal	Internal signal
EXTernal	External input signal
OFF	No pulse modulation

Example of Use

To set the pulse modulation signal source to internal signal.

```
RAD:ARB:PULM:SOUR INT
```

[:SOURce]:RADio:ARB:PULM:SOURce?

Pulse Modulation Source Query

Function

This command queries the pulse modulation signal source.

Query

```
[:SOURce]:RADio:ARB:PULM:SOURce?
```

Response

```
<source>
```

Parameter

<source>	Pulse modulation signal source.
INT	Internal signal
EXT	External input signal
OFF	No pulse modulation

Example of Use

To query the status of the pulse modulation signal source.

```
RAD:ARB:PULM:SOUR?
> INT
```

2.6.2 External Trigger Mode

[:SOURce]:RADio:ARB:TRIGger:TYPE STARt|FRAMe

External Trigger - Mode

Function

This command sets the external trigger operation mode.

Command

```
[:SOURce]:RADio:ARB:TRIGger:TYPE <mode>
```

Parameter

<mode>	External trigger operation mode.
STARt	Start trigger
FRAMe	Frame trigger

Example of Use

To set the external trigger operation mode to start trigger.

```
RAD:ARB:TRIG:TYPE START
```

[:SOURce]:RADio:ARB:TRIGger:TYPE?

External Trigger - Mode Query

Function

This command queries the external trigger operation mode.

Query

```
[:SOURce]:RADio:ARB:TRIGger:TYPE?
```

Response

```
<mode>
```

Parameter

<mode>	External trigger operation mode.
STAR	Start trigger
FRAM	Frame trigger

Example of Use

To query the external trigger operation mode.

```
RAD:ARB:TRIG:TYPE?
> STAR
```

2.6.3 External Trigger

[:SOURce]:RADio:ARB:TRIGger[:STATe] ON|OFF|0|1

External Trigger - On/Off

Function

This command sets the external trigger ON/OFF.

Command

```
[:SOURce]:RADio:ARB:TRIGger[:STATe] <on_off>
```

Parameter

<on_off>	External trigger On/Off
ON|1	On
OFF|0	Off

Example of Use

To enable the external trigger.

```
RAD:ARB:TRIG ON
```

[:SOURce]:RADio:ARB:TRIGger[:STATe]?

External Trigger - On/Off Query

Function

This command queries the external trigger ON/OFF status.

Query

```
[:SOURce]:RADio:ARB:TRIGger[:STATe]?
```

Response

```
<on_off>
```

Parameter

<on_off>	External trigger On/Off
1	On
0	Off

Example of Use

To query the external trigger ON/OFF status.

```
RAD:ARB:TRIG?
> 0
```

2.6.4 External Trigger Source

[:SOURce]:RADio:ARB:TRIGger:SOURce EXTernal|KEY|BUS

Start Trigger Delay Source

Function

This command sets the signal source of the external trigger.

Command

```
[:SOURce]:RADio:ARB:TRIGger:SOURce <source>
```

Parameter

<source>	External trigger signal source
EXTernal	External input signal
KEY	Trigger key input
BUS	Remote Command

.

Example of Use

To set the signal source of the external trigger to the external input signal.

```
RAD:ARB:TRIG:SOUR EXT
```

[:SOURce]:RADio:ARB:TRIGger:SOURce?

Start Trigger Delay Source Query

Function

This command queries the signal source of the external trigger.

Query

```
[:SOURce]:RADio:ARB:TRIGger:SOURce?
```

Response

```
<source>
```

Parameter

<source>	External trigger signal source
EXT	External input signal
KEY	Trigger key input
BUS	Remote Command

.

Example of Use

To query the external trigger ON/OFF status.

```
RAD:ARB:TRIG:SOUR?
> EXT
```

2.6.5 External Trigger Delay

[:SOURce]:RADio:ARB:TRIGger:DELay <numeric_value>

Start Trigger Delay

Function

This command sets the RF signal output timing in symbol or chip rate units of each system (determined by the overrate).

Command

```
[:SOURce]:RADio:ARB:TRIGger:DELay <numeric_value>
```

Parameter

<numeric_value>	Start trigger delay time	
Range	Varies depending on the selected waveform pattern.	
Resolution	Varies depending on the selected waveform pattern.	
Default	0	
Unit	None (Symbol or chip)	

Example of Use

To set the start trigger delay time to 30 chips.

```
RAD:ARB:TRIG:DEL 30
```

[:SOURce]:RADio:ARB:TRIGger:DELay?

Start Trigger Delay Query

Function

This command queries the RF signal output timing in symbol or chip rate units of each system (determined by the overrate).

Query

```
[:SOURce]:RADio:ARB:TRIGger:DELay?
```

Response

```
<numeric_value>
```

Parameter

`<numeric_value>`		Start trigger delay time
	Range	Varies depending on the selected waveform pattern.
	Resolution	Varies depending on the selected waveform pattern.
	Default	0
	Unit	None (Symbol or chip)

Example of Use

To query the external trigger ON/OFF status.

```
RAD:ARB:TRIG:DEL?
> 30
```

2.6.6 External Trigger Delay Time

[:SOURce]:RADio:ARB:TRIGger:DELay:TIME?

Start Trigger Delay Time Query

Function

This command queries a value computed by converting the output timing of RF signals into time.

Query

```
[:SOURce]:RADio:ARB:TRIGger:DELay:TIME?
```

Response

```
<numeric_value>
```

Parameter

`<numeric_value>`	Start trigger delay time	
Unit	s	

Example of Use

To query the output timing of the external trigger.

```
RAD:ARB:TRIG:DEL:TIME?
> 6.50E-8
```

2.6.7 External Trigger Edge

[:SOURce]:RADio:ARB:TRIGger:SLOPe POSitive|NEGative

External Trigger Edge

Function

This command sets the polarity of the external trigger input.

Command

```
[:SOURce]:RADio:ARB:TRIGger:SLOPe <edge>
```

Parameter

`<edge>`	External trigger polarity
`POSitive`	Positive
`NEGative`	Negative

Example of Use

To set the polarity of the external trigger to Negative.

```
RAD:ARB:TRIG:SLOP NEG
```

[:SOURce]:RADio:ARB:TRIGger:SLOPe?

External Trigger Edge Query

Function

This command queries the polarity of the external trigger input.

Query

```
[:SOURce]:RADio:ARB:TRIGger:SLOPe?
```

Response

```
<edge>
```

Parameter

`<edge>`	External trigger polarity
`POS`	Positive
`NEG`	Negative

Example of Use

To query the polarity of the external trigger input.

```
RAD:ARB:TRIG:SLOP?
> POS
```

2.6.8 Baseband Reference Clock Source

[:SOURce]:RADio:ARB:CLOCk:REFerence[:SOURce] INTernal|EXTernal

Baseband Reference Clock Source

Function

This command sets baseband signal reference clock.

Command

```
[:SOURce]:RADio:ARB:CLOCk:REFerence[:SOURce] <source>
```

Parameter

<source>	Baseband signal reference clock
INTernal	Internal signal (Default)
EXTernal	External input signal

Example of Use

To set the baseband signal reference clock to external input signal.

```
RAD:ARB:CLOC:REF EXT
```

[:SOURce]:RADio:ARB:CLOCk:REFerence[:SOURce]?

Baseband Reference Clock Source Query

Function

This command queries baseband signal reference clock.

Query

```
[:SOURce]:RADio:ARB:CLOCk:REFerence[:SOURce]?
```

Response

```
<source>
```

Parameter

<source>	Baseband signal reference clock
INT	Internal signal (Default)
EXT	External input signal

Example of Use

To query baseband signal reference clock.

```
RAD:ARB:CLOC:REF?
> INT
```

2.6.9 Baseband Reference Clock

[:SOURce]:RADio:ARB:CLOCk:REFerence:DIVision SIXTeenth|EIGHth|QUARter|HALF|1|2|4|8|16

Baseband Reference Clock

Function

This command sets the baseband signal reference clock frequency in magnification ratio based on the sampling clock.

Command

```
[:SOURce]:RADio:ARB:CLOCk:REFerence:DIVision <clock>
```

Parameter

<clock>	Baseband signal reference clock
SIXTeenth	Sampling Clock × 1/16
EIGHth	Sampling Clock × 1/8
QUARter	Sampling Clock × 1/4
HALF	Sampling Clock × 1/2
1	Sampling Clock × 1
2	Sampling Clock × 2
4	Sampling Clock × 4
8	Sampling Clock × 8
16	Sampling Clock × 16

The setting range is as shown in the following table.

Baseband reference clock setting range

Sampling Clock [MHz]	Baseband Reference Clock Setting								
	16	8	4	2	1	1/2	1/4	1/8	1/16
0.02≤f<0.024414062	✓	✓	✓	✓	✓				
0.024414062≤f<0.048828125	✓	✓	✓	✓	✓	✓			
0.048828125≤f<0.09765625	✓	✓	✓	✓	✓	✓	✓		
0.09765625≤f<0.1953125	✓	✓	✓	✓	✓	✓	✓	✓	
0.1953125≤f<2.5	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.5≤f<5		✓	✓	✓	✓	✓	✓	✓	✓
5≤f<10			✓	✓	✓	✓	✓	✓	✓
10≤f<20				✓	✓	✓	✓	✓	✓
20≤f<40					✓	✓	✓	✓	✓
40≤f<80						✓	✓	✓	✓
80≤f<160							✓	✓	✓

Example of Use

To set the baseband signal reference lock frequency to sampling clock ×2.

```
RAD:ARB:CLOC:REF:DIV 2
```

[:SOURce]:RADio:ARB:CLOCk:REFerence:DIVision?

Baseband Reference Clock Query

Function

This command queries the reference clock frequency of the baseband signal.

Query

```
[:SOURce]:RADio:ARB:CLOCk:REFerence:DIVision?
```

Response

```
<clock>
```

Parameter

<clock>	Baseband signal reference clock
SIXT	Sampling Clock × 1/16
EIGH	Sampling Clock × 1/8
QUAR	Sampling Clock × 1/4
HALF	Sampling Clock × 1/2
1	Sampling Clock × 1
2	Sampling Clock × 2
4	Sampling Clock × 4
8	Sampling Clock × 8
16	Sampling Clock × 16

Example of Use

To query the reference clock frequency of the baseband signal.

```
RAD:ARB:CLOC:REF:DIV?
> 1
```

2.6.10 Frame Count

[:SOURce]:RADio:ARB:TRIGger:FRAMe:COUNt <integer>

Frame Count

Function

This command sets the Frame Count from the Signal Generator option.

Command

```
[:SOURce]:RADio:ARB:TRIGger:FRAMe:COUNt <integer>
```

Parameter

`<integer>,n`		Specifying the output frame count
	Range	1 to 32767
	Resolution	1
	Default	1

Example of Use

To set the output frame count to 10.

```
RAD:ARB:TRIG:FRAM:COUN 10
```

[:SOURce]:RADio:ARB:TRIGger:FRAMe:COUNt?

Frame Count Query

Function

This command queries the Frame Count from the Signal Generator option.

Query

```
[:SOURce]:RADio:ARB:TRIGger:FRAMe:COUNt?
```

Response

```
<integer>,n
```

Parameter

`<integer>`		Number of output frames
	Range	1 to 32767
	Resolution	1

Example of Use

To query the Frame Count from the Signal Generator option.

```
RAD:ARB:TRIG:FRAM:COUN?
> 10
```

2.6.11 Remote Command Trigger

[:SOURce]:RADio:ARB:TRIGger:GENerate

Remote Command Trigger

Function

This command triggers the output of waveform pattern. This becomes available when Trigger Source is BUS.

Command

```
[:SOURce]:RADio:ARB:TRIGger:GENerate
```

Example of Use

To trigger the output of waveform pattern.

```
RAD:ARB:TRIG:GEN
```

2.7 External output signal settings

Table 2.7-1 shows device messages for setting external output signals.

Table 2.7-1 Device messages for setting external output signals

Function	Device Messages
Marker Polarity	`[:SOURce]:RADio:ARB:MARKer1|2|3:POLarity POSitive|NEGative`
	`[:SOURce]:RADio:ARB:MARKer1|2|3:POLarity?`
Marker Edit	`[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT[:STATe] ON|OFF|1|0|PATSync`
	`[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT[:STSTe]?`
Marker Pulse Cycle Value	`[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:CYCLe <numeric_value>`
	`[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:CYCLe?`
Marker Pulse Start Offset Value	`[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:OFFSet <numeric_value>`
	`[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:OFFSet?`
Marker Pulse Width Value	`[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:WIDTh <numeric_value>`
	`[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:WIDTh?`

2.7.1 Marker Polarity

[:SOURce]:RADio:ARB:MARKer1|2|3:POLarity POSitive|NEGative

Marker Polarity

Function

This command sets the polarity of the external output marker signal.

Command

```
[:SOURce]:RADio:ARB:MARKer[n]:POLarity <polarity>
```

Parameter

<n>	Marker type
1	Marker 1
2	Marker 2
3	Marker 3
<polarity>	Polarity
POSitive	Positive (Positive polarity)
NEGative	Negative (Negative polarity)

Example of Use

To set the polarity of Marker 1 to negative.

```
RAD:ARB:MARK1:POL NEG
```

[:SOURce]:RADio:ARB:MARKer1|2|3:POLarity?

Marker Polarity Query

Function

This command queries the polarity of the external output marker signal.

Query

```
[:SOURce]:RADio:ARB:MARKer[n]:POLarity?
```

Response

```
<polarity>
```

Parameter

<n>	Marker type
1	Marker 1
2	Marker 2
3	Marker 3
<polarity>	Polarity
POS	Positive (Positive polarity)
NEG	Negative (Negative polarity)

Example of Use

To query the polarity of Marker 1.

```
RAD:ARB:MARK1:POL?
> POS
```

2.7.2 Marker Edit

[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT[STATe] ON|OFF|1|0|PATSync

Marker Edit

Function

This command specifies the user setting mode for the external output marker.

Command

```
[:SOURce]:RADio:ARB:MARKer[n]:EDIT[:STATe] <mode>
```

Parameter

<n>		Marker type
	1	Marker 1
	2	Marker 2
	3	Marker 3
<mode>		User setting mode
	ON|1	Outputs the user setting marker.
	OFF|0	Outputs the marker previously recorded in the waveform pattern.
	PATSync	Outputs the marker at the start of the waveform pattern.

Details

OFF|0 can be set only when a waveform with a resolution of 14 bit IQ data is selected. When a waveform with a resolution of 15 or 16 bits is selected, the following restriction applies:

15-bit resolution: Markers 2 and 3 cannot be set to OFF|0.

16-bit resolution: Markers 1 and 3 cannot be set to OFF|0.

Example of Use

To set the Marker 1 to user setting mode.

```
RAD:ARB:MARK1:EDIT ON
```

[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT[:STSTe]?

Marker Edit Query

Function

This command queries the user setting mode for the external output marker.

Query

```
[:SOURce]:RADio:ARB:MARKer[n]:EDIT[:STSTe]?
```

Response

```
<mode>
```

Parameter

<n>		Marker type
	1	Marker 1
	2	Marker 2
	3	Marker 3
<mode>		User setting mode
	1	Outputs the user setting marker.
	0	Outputs the marker previously recorded in the waveform pattern.
	PATS	Outputs the marker at the start of the waveform pattern.

Example of Use

To query the setting mode for the external output marker of Marker 1.

```
RAD:ARB:MARK1:EDIT?
> 1
```

2.7.3 Marker Pulse Cycle Value

[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:CYCLe <numeric_value>

Marker Edit Mode Cycle Value

Function

This command sets the output pulse cycle when the external output marker is set to the user setting marker.

Command

```
[:SOURce]:RADio:ARB:MARKer[n]:EDIT:CYCLe <numeric_value>
```

Parameter

<n>	Marker type
1	Marker 1
2	Marker 2
3	Marker 3
<numeric_value>	Output pulse cycle

Example of Use

To set the output pulse cycle of Marker 1 to 200.

```
RAD:ARB:MARK1:EDIT:CYCL 200
```

[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:CYCLe?

Marker Edit Mode Cycle Value Query

Function

This command queries the output pulse cycle when the external output marker is set to the user setting marker.

Query

```
[:SOURce]:RADio:ARB:MARKer[n]:EDIT:CYCLe?
```

Response

```
<numeric_value>
```

Parameter

`<n>`	Marker type
`1`	Marker 1
`2`	Marker 2
`3`	Marker 3
`<numeric_value>`	Output pulse cycle

Example of Use

To query the output pulse cycle of Marker 1.

```
RAD:ARB:MARK1:EDIT:CYCL?
> 200.00
```

2.7.4 Marker Pulse Start Offset Value

[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:OFFSet <numeric_value>

Marker Edit Mode Start Offset Value

Function

This command sets the output pulse starting offset when the external output marker is set to the user setting marker.

Command

```
[:SOURce]:RADio:ARB:MARKer[n]:EDIT:OFFSet <numeric_value>
```

Parameter

<n>	Marker type
1	Marker 1
2	Marker 2
3	Marker 3
<numeric_value>	Starting offset value

Example of Use

To set the starting offset of marker 1 to 100.

```
RAD:ARB:MARK1:EDIT:OFFS 100
```

[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:OFFSet?

Marker Edit Mode Start Offset Value Query

Function

This command queries the output pulse starting offset when the external output marker is set to the user setting marker.

Query

```
[:SOURce]:RADio:ARB:MARKer[n]:EDIT:OFFSet?
```

Response

```
<numeric_value>
```

Parameter

<n>	Marker type
1	Marker 1
2	Marker 2
3	Marker 3
<numeric_value>	Starting offset value

Example of Use

To query the starting offset value of Marker 1.

```
RAD:ARB:MARK1:EDIT:OFFS?
> 100.00
```

2.7.5 Marker Pulse Width Value

[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:WIDTh <numeric_value>

Marker Edit Mode Width Value

Function

This command sets the output pulse width when the external output marker is set to the user setting marker.

Command

```
[:SOURce]:RADio:ARB:MARKer[n]:EDIT:WIDTh <numeric_value>
```

Parameter

<n>	Marker type
1	Marker 1
2	Marker 2
3	Marker 3
<numeric_value>	Pulse width

Example of Use

To set the pulse width of marker 1 to 50.

```
RAD:ARB:MARK1:EDIT:WIDT 50
```

[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:WIDTh?

Marker Edit Mode Width Value Query

Function

This command queries the output pulse width when the external output marker is set to the user setting marker.

Query

```
[:SOURce]:RADio:ARB:MARKer[n]:EDIT:WIDTh?
```

Response

```
<numeric_value>
```

Parameter

`<n>`	Marker type
`1`	Marker 1
`2`	Marker 2
`3`	Marker 3
`<numeric_value>`	Pulse width

Example of Use

To query the pulse width of marker 1.

```
RAD:ARB:MARK1:EDIT:WIDT?
> 50.00
```

2.8 Setting Trigger to Be Output to SG Marker of SA/SPA

Table 2.8-1 shows the device messages for setting the trigger to be output to the SG marker of SA/SPA.

Table 2.8-1 Device messages for setting the trigger to be output to the SG marker of SA/SPA

Function	Device Messages
SA Trigger Out	:ROUTe:SATRigger[:OUTPut] MARKer1|2|3|PATSync
	:ROUTe:SATRigger[:OUTPut]?

2.8.1 SA Trigger Out

:ROUTe:SATRigger[:OUTPut] MARKer1|2|3|PATSync

SA Trigger Out

Function

This command selects the type of the trigger to be output to the SG marker of SA/SPA.

Command

```
:ROUTe:SATRigger[:OUTPut] <triggertoSA>
```

Parameter

<triggertoSA>	Output trigger
MARKer1	Marker 1
MARKer2	Marker 2
MARKer3	Marker 3
PATSync	A marker synchronized with the top of pattern

Example of Use

To select the type of the trigger to be output to the SG marker of SA/SPA.

```
ROUT:SATR MARK1
```

:ROUTe:SATRigger[:OUTPut]?

SA Trigger Out Query

Function

This command queries the type of the trigger to be output to the SG marker of SA/SPA.

Query

```
:ROUTe:SATRigger[:OUTPut]?
```

Response

```
<triggertoSA>
```

Parameter

`<triggertoSA>`	Output trigger
`MARK1`	Marker 1
`MARK2`	Marker 2
`MARK3`	Marker 3
`PATS`	A marker synchronized with the top of pattern

Example of Use

To query the type of the trigger to be output to the SG marker of SA/SPA.

```
ROUT:SATR?
> MARK1
```

2.9 Display Settings

Table 2.9-1 shows the device messages for setting the display function.

Table 2.9-1 Device messages for setting the display function

Function	Device Messages
SG Window Position	:DISPlay[:WINDow]:POSition TOP|BOTTom
	:DISPlay[:WINDow]:POSition?

2.9.1 SG Window Position

:DISPlay[:WINDow]:POSition TOP|BOTTom

SG Window Position

Function

This command switches the display position of the Signal Generator screen.

Command

```
:DISPlay[:WINDow]:POSition <position>
```

Parameter

<position>	Display position
TOP	Top
BOTTom	Bottom

Example of Use

To display the Signal Generator screen at the lower portion.

```
DISP:POS BOTT
```

:DISPlay[:WINDow]:POSition?

SG Window Position Query

Function

This command queries the display position of the Signal Generator screen.

Query

```
:DISPlay[:WINDow]:POSition?
```

Response

```
<position>
```

Parameter

`<position>`	Display position
`TOP`	Top
`BOTT`	Bottom

Example of Use

To query the display position of the Signal Generator screen.

```
DISP:POS?
> BOTT
```

2.10 Other Settings

Table 2.10-1 shows the device messages for setting other functions.

Table 2.10-1 Device Messages for Other Settings

Function	Device Messages
SG Status	:STATus:ERRor?

2.10.1 SG Status

:STATus:ERRor?

SG Status Query

Function

This command queries the SG operating status (normal/malfunction) when the application to be operated is SG.

Query

```
:STATus:ERRor?
```

Response

```
<status>
```

Parameter

<status> Measurement status

Value = bit0 + bit1 + bit2 + bit3 + bit4 + bit5 + bit6 + bit7 + bit8 + bit9 + bit10 + bit11 + bit12 + bit13 + bit14 + bit15

The bit assignments are as follows:

bit0 : 2^0 = 1 Lock malfunction occurred while external reference signal source was being used
bit1 : 2^1 = 2 ALC circuit is abnormal.
bit2 : 2^2 = 4 Outside level accuracy assurance
bit3 : 2^3 = 8 (Not used)
bit4 : 2^4 = 16 (Not used)
bit5 : 2^5 = 32 (Not used)
bit6 : 2^6 = 64 (Not used)
bit7 : 2^7 = 128 (Not used)
bit8 : 2^8 = 256 (Not used)
bit9 : 2^9 = 512 (Not used)
bit10 : 2^{10} = 1024 (Not used)
bit11 : 2^{11} = 2048 (Not used)

bit12 : 2^{12} = 4096 (Not used)
bit13 : 2^{13} = 8192 (Not used)
bit14 : 2^{14} = 16384 (Not used)
bit15 : 215 = 32768 (Not used)

Range 0 to 65535

Details

0 is returned if the operation is normal.

Example of Use

To query the current operation status.

```
STAT:ERR?
> 0
```

Chapter 3 Native Device Message List

This chapter describes remote control commands for executing functions of this application using a list organized by functions. Refer to Chapter 4 “Device Message Details” for detailed specifications for each command. Refer to the MS2690A/MS2691A/MS2692A or MS2830A Signal Analyzer Operation Manual (Mainframe Remote Control) for detailed specifications on IEEE488.2 common device messages and application common device messages.

3.1 IEEE488.2 Common Device Messages

IEEE488.2 common device messages available in this application are shown in Table 3.1-1.

Table 3.1-1 IEEE488.2 common device messages

Function	Command	Query	Response	Remarks
Identification	---	*IDN?	ANRITSU,model,serial,version	model: Main unit model name serial: Main unit serial number version: Software package version
Operation Complete	*OPC	*OPC?	1	
Preset (All Application)	*RST	---	---	
Self Test	---	*TST?	result	Result: Self test results = 0 | 1
Wait to Continue	*WAI	---	---	
Clear Status	*CLS	---	---	
Service Request Enable Register	*SRE byte	*SRE?	byte	byte = bit7 : EESB7 bit6 : Not used bit5 : ESB bit4 : MAV bit3 : EESB3 bit2 : EESB2 bit1 : EESB1 (ERROR Event) bit0 : EESB0 (END Event)

Table 3.1-1 IEEE488.2 common device messages (Continued)

Function	Command	Query	Response	Remarks
Status Byte Register	---	*STB?	byte	byte = bit7 : EESB7 bit6 : MSS/RQS bit5 : ESB bit4 : MAV bit3 : EESB3 bit2 : EESB2 bit1 : EESB1 (ERROR Event) bit0 : EESB0 (END Event)
Standard Event Status Enable Register	*ESE byte	*ESE?	byte	byte = bit7: Power on bit6: User request bit5: Command error bit4: Execution error bit3: Device error bit2: Query error bit1: Not used bit0: Operation complete
Standard Event Status Register	---	*ESR?	byte	

3.2 Application Common Device Messages

Application common device messages available in this application are shown in Table 3.2-1.

Table 3.2-1 Application common device messages

Function	Command	Query	Response	Remarks
Application Switch	SYS apl,window	SYS? apl	status,window	apl: Application name = SG window: Window status = ACT | INACT | MIN | NON status: Application execution status = CURRENT | IDLE | RUN | UNLOAD
Preset (All Application)	*RST	---	---	
Preset (Active Application only)	PRE	---	---	
	INI	---	---	
System Restart	REBOOT	---	---	
LCD Power	DISPLAY on_off	DISPLAY?	on_off	
Error Display Mode	REMDISP mode	REMDISP?	mode	mode : Display mode = NORMAL | REMAIN | REMAIN_LAST
Save Parameter	SVPRM	---	---	fname : Filename dev Drive name = D | E | ...
	SVPRM fname,dev	---	---	
Recall Parameter	RCPRM fname,dev,apl	---	---	fname : Filename dev Drive name = D | E | ... apl : Target application = ALL | CURR
	RCPRM fname,dev	---	---	

Table 3.2-1 Application common device messages (Continued)

Function	Command	Query	Response	Remarks
Hard Copy	PRINT	---	---	fname : Filename dev Drive name = D | E | ...
	PRINT fname,dev	---	---	
Hard Copy Mode	PMOD format	PMOD?	format	format : Specifies file format = BMP | PNG
	PMOD	PMOD?	BMP	
Extended End Event Status Enable Register	ESE0 n	ESE0?	byte	byte = Status bit bit7 : Not used bit6 : Not used bit5 : Not used bit4 : Not used bit3 : Not used bit2 : Not used bit1 : Not used bit0 : Signal Generator
Extended End Event Status Register	---	ESR0?	byte	
Extended Error Event Status Enable Register	ESE1 n	ESE1?	byte	byte = Status bit bit7 : Not used bit6 : Not used bit5 : Not used bit4 : Not used bit3 : Not used bit2 : Not used bit1 : Not used bit0 : Signal Generator
Extended Error Event Status Register	---	ESR1?	byte	

Table 3.2-1 Application common device messages (Continued)

Function	Command	Query	Response	Remarks
END Event Status Enable Register	ESEEND n	ESEEND?	byte	byte = Status bit bit7 : Not used bit6 : Not used bit5 : Waveform pattern copied bit4 : Waveform pattern loaded bit3 : Not used bit2 : Not used bit1 : Not used bit0 : Not used
END Event Status Register	---	ESREND?	byte	
ERROR Event Status Enable Register	ESEERR n	ESEERR?	byte	byte = Status bit bit7 : Not used bit6 : Not used bit5 : Waveform pattern copy error bit4 : Waveform pattern load error bit3 : Not used bit2 : Not used bit1 : Not used bit0 : Not used
ERROR Event Status Register	---	ESRERR?	byte	

3.3 Frequency Settings

Device messages for setting frequencies are shown in Table 3.3-1.

Table 3.3-1 Frequency setting messages

Function	Command	Query	Response	Remarks
Frequency	FREQ freq	FREQ?	freq	
Frequency Step Value	FIS freq	FIS?	freq	
Frequency Step Up/Down	FRS up_down	---	---	
RF Spectrum	SPREV mode	SPREV?	mode	mode: Invert output waveform = ON | OFF

3.4 Level Settings

Device messages for setting levels are shown in Tables 3.4-1 to 3.4-2.

Table 3.4-1 Level setting messages

Function	Command	Query	Response	Remarks
RF Output	LVL on_off	LVL?	on_off	
Output Level	OLVL level	OLVL? unit	level	unit: Units = DBM | DBU
Output Level Step Value	OIS level	OIS?	level	
Output Level Step	OLS up_down	---	---	up_down : Up/Down = UP | DOWN | DN
Output Level Unit	OLU unit	OLU?		unit: Units = DBM | DBU
Volt Unit Display	VDSPL unit	VDSPL?	unit	unit: Voltage unit display system = EMF | TERM
Level Offset	OOF on_off	OOF?	on_off	
Level Offset Value	OOS level	OOS?	level	
Relative Level	ORL on_off	ORL?	on_off	
Relative Level Value	ORLV level	ORLV?	level	
Reference of Relative Level	---	ORLR?	level	

Table 3.4-1 Level setting messages (Continued)

Function	Command	Query	Response	Remarks
SG Level Calibration	LVLCAL	---	---	
ALC Status	---	ALCSTT?	status	status: ALC status = NORMAL | ALCALARM
Unleveled Status	--	LVLACCSTT?	unleveled	unleveled: Output level accuracy status = NORMAL | UNLEVELED
Level Status List	---	LVLSTTLST?	unit,offset,unleveled,INTALC,CONTOFF,relative,NORMAL	unit: Voltage unit display = EMF | TERM offset: Level offset = OFFSETON | OFFSETOFF unleveled: Output level accuracy status = NORMAL | UNLEVELED INTALC : Fixed Value CONTOFF : Fixed Value relative: Relative output mode = RELON | RELOFF NORMAL : Fixed Value

3.5 Controlling Waveform Patterns in Waveform Memory

Tables 3.5-1 and Table 3.5-2 show the device messages for controlling waveform patterns loaded into the waveform memory.

Table 3.5-1 Controlling waveform patterns in waveform memory

Function	Command	Query	Response	Remarks
Waveform Restart	DLRES	---	---	
Waveform Status	---	PATRUNSTT?	status	status : playback status = STOP | PLAY
Select Pattern file on Wave Memory	LOADEDFILESEL package,pattern	LOADEDFILESEL?	package,pattern	package : package name pattern : pattern name
	PAT package,pattern	PAT?	package,pattern	
Delete Pattern file on Wave Memory	DELFILEWM package,pattern	---	---	
	DELPATWM package,pattern	---	---	
Delete All Pattern files on Wave Memory (Clear Wave Memory)	DELFILEWM ALL	---	---	
Number of loaded pattern files	---	LOADEDFILENUM?	number	number : Waveform pattern number
	---	PATNUM?	number	

Table 3.5-2 Controlling waveform patterns in waveform memory (Continued)

Function	Command	Query	Response	Remarks
List of Loaded Pattern Files	`---`	`LOADEDFILENAME? number`	`package,pattern`	`number` : Waveform pattern number `package` : package name `pattern` : pattern name
	`---`	`PATNAME? number`	`package,pattern`	
Wave Memory Size	`---`	`WMSPC?`	`blank1,blank2,total`	blank1 : Free memory space (byte) blank2 : Contiguous free memory space (byte) total : Total memory space

3.6 Controlling Waveform Patterns in HDD

Table 3.6-1 shows the device messages for controlling waveform patterns in the hard disk.

Table 3.6-1 Controlling waveform patterns in HDD

Function	Command	Query	Response	Remarks
Load Pattern File / Query Load Status and Wave Memory	LDFILE package,pattern	LDFILE? package,pattern	status	package : package name pattern : pattern name status : Loaded
	LDPAT package,pattern	LDPAT? package,pattern		
Cancel Loading	LDCANCEL	---	---	
Pattern File Version	---	FILEVER? package,pattern	version	package : package name pattern : pattern name version : Version number
Hard Disk Drive Size	---	HDDSPC?	total,blank	total : Total hard disk capacity blank : Free space in hard disk
Copy pattern file to Hard Disk Drive	CPYPATTOHDD drive,package	---	---	drive : Name of destination drive package : package name
Delete Pattern file on Hard Disk Drive	DELFILEHDD package,pattern	---	---	package : package name pattern : pattern name
	DELPATHDD package,pattern	---	---	

3.7 Modulation and AWGN Settings

Device messages for setting modulation and AWGN are shown in Table 3.7-1.

Table 3.7-1 Modulation and AWGN setting messages

Function	Command	Query	Response	Remarks
Modulation	MOD on_off	MOD?	on_off	
Sampling Clock	---	SAMPLINGCLK?	freq	
AWGN	AWGN on_off	AWGN?	on_off	
C/N Ratio	PATWMPOWRATIO level	PATWMPOWRATIO?	level	
Target of C/N Setting	POWRATIOTARGET target	POWERRATIOTARGET?	target	target : target to change = CARRIER | NOISE | CONSTANT
Carrier Power	CARRIERPOW level	CARRIERPOW?	level	

3.8 External Input Signal Settings

Device messages for external input settings are shown in Table 3.8-1.

Table 3.8-1 External input signal setting messages

Function	Command	Query	Response	Remarks
External Trigger	SFTRG on_off	SFTRG?	on_off	
External Trigger Source	STDLYSRC source	STDLYSRC?	source	source : signal source = EXTTRG | KEY | BUS
External Trigger Mode	SFTRGMODE mode	SFTRGMODE?	mode	mode : operating time = START | FRAME
	STGS mode	STGS?	mode	mode : operating time = INT | EXTSTA | EXTFRM
External Trigger Delay	STDLYSYM delay	STDLYSYM?	delay	delay : delay time = (Number of symbols or chips)
	---	STDLYTIME?	time	time : delay time (s)
External Trigger Edge	EIST edge	EIST?	edge	edge : polarity = RISE | FALL
Baseband Reference Clock Source	REFCLKSRC source	REFCLKSRC?	source INT	source : clock source = INT | EXT |
Baseband Reference Clock	REFCLKVAL clock	REFCLKVAL?	clock	clock : reference clock = SIXTEENTH | EIGHTH | QUARTER | HALF | 1 | 2 | 4 | 8 | 16
Baseband Reference Clock Condition	---	BBREFCOND?	status	status : lock status = NORMAL | CHKEXT
Pulse Modulation Source	PMO source	PMO?	source	source : signal source = INT | EXT | OFF

Table 3.8-1 External input signal setting messages（Cont'd）

Function	Command	Query	Response	Remarks
Frame Count	FRAMECOUNT integer	FRAMECOUNT?	integer	integer : Number of output frames
Remote Command Trigger	SFTGGENBUS	---	---	

3.9 External Output Signal Settings

Device messages for external output settings are shown in Table 3.9-1.

Table 3.9-1 External output signal setting messages

Function	Command	Query	Response	Remarks
Marker Edit	MARKEREDIT marker,mode	MARKEREDIT? marker	mode	marker : marker type = 1 | 2 | 3 mode : marker mode = OFF | ON | PATSYNC
Marker Polarity	MARKERPOL marker,polarity	MARKERPOL? marker	polarity	marker : marker type = 1 | 2 | 3 polarity : polarity = POSITIVE | NEGATIVE
Marker Pulse Start Offset Value	MARKEREDITOFFSET marker,offset	MARKEREDITOFFSET? marker	offset	marker : marker type = 1 | 2 | 3 offset : pulse start offset
Marker Pulse Width Value	MARKEREDITWIDTH marker,width	MARKEREDITWIDTH? marker	width	marker : marker type = 1 | 2 | 3 width : pulse width
Marker Pulse Cycle Value	MARKEREDITCYCLE marker,cycle	MARKEREDITCYCLE? marker	cycle	marker : marker type = 1 | 2 | 3 cycle : pulse cycle

3.10 Setting Trigger to Be Output to SG Marker of SA/SPA

Tables 3.10-1 shows the device messages for setting the trigger to be output to the SG marker of SA/SPA.

Table 3.10-1 Setting trigger to be output to SG marker of SA/SPA

Function	Command	Query	Response	Remarks
SA Trigger Out	SATRGOUT triggertoSA	SATRGOUT?	triggertoSA	triggertoSA : trigger selection = MARKER1 | MARKER2 | MARKER3 | PATSYNC

3.11 Display Settings

Device messages for display settings are shown in Table 3.11-1.

Table 3.11-1 Display setting messages

Function	Command	Query	Response	Remarks
SG Window Position	SGWINDOWPOS position	SGWINDOWPOS?	position	position : display position = TOP | BOTTOM

Chapter 4 Native Device Message Details

This chapter describes detailed specifications on remote control commands for executing functions of this application, in alphabetical order. Refer to the "MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer Operation Manual (Mainframe Remote Control)" for detailed specifications of the IEEE488.2 common device messages and application common device messages.

ALCSTT?

ALC Status Query

Function

This command queries the output level alarm information.

Query

```
ALCSTT?
```

Response

```
status
```

Parameter

`status`	Level alarm status
`NORMAL`	Normal state
`ALCALARM`	ALC circuit is abnormal.

Example of Use

To query level alarm status.

```
ALCSTT?
```

AWGN/AWGN?

AWGN

Function

This command turns AWGN output ON/OFF.

Command

```
AWGN on_off
```

Query

```
AWGN?
```

Response

```
on_off
```

Parameter

`on_off`	AWGN output On/Off
`ON`	On
`OFF`	Off

Details

Outputs a signal with AWGN added when AWGN is ON.
The AWGN output function can be set to ON or OFF only when a waveform pattern file is selected and the modulation is enabled (ON).

The AWGN output function is automatically set to OFF when a waveform pattern is changed.

Example of Use

To add AWGN to output signal.

```
AWGN ON
```

BBREFCOND?

Baseband Reference Clock Condition

Function

This command queries the lock status of the baseband reference clock.

Query

```
BBREFCOND?
```

Response

```
status
```

Parameter

`status`	Lock status of reference clock
`NORMAL`	Normal
`CHKEXT`	Lock abnormal status when an external reference signal source is used.

Example of Use

To query the lock status of the baseband reference clock.

```
BBREFCOND?
```

CARRIERPOW/CARRIERPOW?

Carrier Power

Function

This command sets the carrier signal level when AWGN is ON.

Command

```
CARRIERPOW level
```

Query

```
CARRIERPOW?
```

Response

```
level
```

Parameter

`level`		Carrier signal level when AWGN is ON.
	Range	
	Resolution	0.01 dB
	Suffix code	`DBM`

Example of Use

To set the carrier signal level when AWGN is ON to –55.0 dBm.

```
AWGN ON
CARRIERPOW -55.0DBM
```

Related Command

`AWGN`	AWGN On/Off setting

CPYPATTOHDD

Copy pattern file to Hard Disk Drive

Function

This command copies the waveform pattern file from the specified drive to the internal hard disk drive. Specify a waveform pattern by using a package name. The package name is the name of the folder that stores the waveform pattern file.

Command

```
CPYPATTOHDD drive,package
```

Parameter

`drive`	Copy source drive name (D to Z, D when omitted)
`package`	Package name to copy (Character string) Or, ROOT

Details

An error occurs when the specified drive or waveform pattern file cannot be found.

When the package name (package) is omitted, all the packages in the root folder of the specified drive will be copied.

When `ROOT` is specified for `<package>`, all the patterns in the root folder of the specified drive will be copied.

Example of Use

To copy the waveform pattern in the package "WCDMA" of Drive D to the internal hard disk.

```
CPYPATTOHDD D,"WCDMA"
```

DELFILEHDD

Delete Pattern file on Hard Disk Drive

Function

This command deletes the waveform pattern file on the hard disk.

Command

```
DELFILEHDD package,pattern
```

Parameter

`package`	Package name (Character string)
`pattern`	Pattern name (Character string)

Details

This command does not delete waveform patterns in the waveform memory.

Example of Use

To delete the "TEST" pattern in the package "WCDMA".

```
DELFILEHDD "WCDMA","TEST"
```

Related Command

`DELPATHDD`	Same as `DELFILEHDD`

DELFILEWM

Delete Pattern file on Waveform Memory

Function

This command deletes the waveform pattern file in the waveform memory.

Command

```
DELFILEWM package,pattern
DELFILEWM ALL
```

Parameter

`package`	Package name (Character string)
`ALL`	Deleting All Waveform Patterns
`pattern`	Pattern name (Character string)

Details

This command does not delete waveform patterns on the hard disk.

Example of Use

To delete the "TEST" pattern in the package "WCDMA".

```
DELFILEWM "WCDMA","TEST"
```

Related Command

`DELPATWM`	Same as `DELFILEWM`

DELPATHDD

Delete Pattern file on Hard Disk Drive

Function

This command deletes the waveform pattern file on the hard disk.

Same as DELFILEHDDRefer to section explaining DELFILEHDD.

DELPATWM

Delete Pattern file on Waveform Memory

Function

This command deletes the waveform pattern file in the waveform memory.

Same as DELFILEWM. Refer to section explaining DELFILEWM.

DLRES

Waveform Restart

Function

This command plays waveform pattern from the beginning.

Command

```
DLRES
```

Example of Use

To play waveform pattern from the beginning.

```
DLRES
```

EIST/EIST?

External Trigger Edge

Function

This command sets the polarity of the external trigger input.

Command

```
EIST edge
```

Query

```
EIST?
```

Response

```
edge
```

Parameter

`edge`	External trigger polarity
`RISE`	Rise
`FALL`	Fall

Example of Use

To set the external trigger polarity to Fall.

```
EIST FALL
```

Related Command

`SFTRG`	External trigger On/Off setting.

ESE0/ESE0?

Extended End Event Status Enable Register

Function

This command sets the extended end event status enable register. When an end event occurs in the specified application, the end summary bit (ESB) value of the corresponding status byte register is set to 1 (true).

Command

```
ESE0 n
```

Query

```
ESE0?
```

Response

n

Parameter

n Extended end event status enable register

Value = bit0 + bit1 + ... + bit7

bit7 = 2^7 = 128	Bit 7: Not used
bit6 = 2^6 = 64	Bit 6: Not used
bit5 = 2^5 = 32	Bit 5: Not used
bit4 = 2^4 = 16	Bit 4: Not used
bit3 = 2^3 = 8	Bit 3: Not used
bit2 = 2^2 = 4	Bit 2: Not used
bit1 = 2^1 = 2	Bit 1: Not used
bit0 = 2^0 = 1	Bit 0: Signal Generator Function

Details

Set the sum of the values for bits to be enabled to the parameter, from the values 2^0 = 1, 2^1 = 2, 2^2 = 4, 2^3 = 8, 2^4 = 16, 2^5 = 32, 2^6 = 64, and 2^7 = 128, corresponding to the extended end event status enable register bits 0, 1, 2, 3, 4, 5, 6, and 7.

Example of Use

To enable an end event for the Signal Generator function.

```
ESE0 1
```

Related Command

`ESR0?`	Extended end event status register query.

ESE1/ESE1?

Extended Error Event Status Enable Register

Function

This command sets the extended error event status enable register. When an error event occurs in the specified application, the end summary bit (ESB) value of the corresponding status byte register is set to 1 (true).

Command

`ESE1 n`

Query

`ESE1?`

Response

n

Parameter

n Extended error event status enable register

Value = bit0 + bit1 + ... + bit7

bit7 = 2^7 = 128	Bit 7: Not used
bit6 = 2^6 = 64	Bit 6: Not used
bit5 = 2^5 = 32	Bit 5: Not used
bit4 = 2^4 = 16	Bit 4: Not used
bit3 = 2^3 = 8	Bit 3: Not used
bit2 = 2^2 = 4	Bit 2: Not used
bit1 = 2^1 = 2	Bit 1: Not used
bit0 = 2^0 = 1	Bit 0: Signal Generator Function

Details

Set the sum of the values for bits to be enabled to the parameter, from the values 2^0 = 1, 2^1 = 2, 2^2 = 4, 2^3 = 8, 2^4 = 16, 2^5 = 32, 2^6 = 64, and 2^7 = 128, corresponding to the extended error event status enable register bits 0, 1, 2, 3, 4, 5, 6, and 7.

Example of Use

To enable an error event for the Signal Generator function.

```
ESE1 1
```

Related Command

`ESR1?` Extended error event status register query.

ESEEND/ESEEND?

End Event Status Enable Register

Function

This command sets the end event status enable register that can be used for the Signal Generator function. When a specified end event occurs, the end summary bit (ESB) value corresponding to the event is set to 1 (true).

Command

```
ESEEND n
```

Query

```
ESEEND?
```

Response

n

Parameter

n End event status enable register

Value = bit0 + bit1 + ... + bit7

Signal Generator function

bit7 = 2^7 = 128 Bit 7: Not used
bit6 = 2^6 = 64 Bit 6: Not used
bit5 = 2^5 = 32 Bit 5: Completion of waveform pattern copy
bit4 = 2^4 = 16 Bit 4: Completion of waveform pattern loading to waveform memory
bit3 = 2^3 = 8 Bit 3: Not used
bit2 = 2^2 = 4 Bit 2: Not used
bit1 = 2^1 = 2 Bit 1: Not used
bit0 = 2^0 = 1 Bit 0: Not used

Details

Set the sum of the values for bits to be enabled to the parameter, from the values 2^0 = 1, 2^1 = 2, 2^2 = 4, 2^3 = 8, 2^4 = 16, 2^5 = 32, 2^6 = 64, and 2^7 = 128, corresponding to the end event status enable register bits 0, 1, 2, 3, 4, 5, 6, and 7.

Example of Use

To enable the waveform pattern loading completion event.

```
SYS SG
ESEEND 16
```

Related Command

ESREND? End event status register query.

ESEERR/ESEERR?

Error Event Status Enable Register

Function

This command sets the error event status enable register that can be used for the Signal Generator function. When a specified error event occurs, the error summary bit (ESB) value corresponding to the event is set to 1 (true).

This command can be used for the currently active function.

Command

```
ESEERR n
```

Query

```
ESEERR?
```

Response

n

Parameter

n Error event status enable register

Value = bit0 + bit1 + ... + bit7

Signal Generator function

bit7 = 2^7 = 128	Bit 7: Not used
bit6 = 2^6 = 64	Bit 6: Not used
bit5 = 2^5 = 32	Bit 5: Waveform pattern copy error
bit4 = 2^4 = 16	Bit 4: Waveform pattern loading to waveform memory error
bit3 = 2^3 = 8	Bit 3: Not used
bit2 = 2^2 = 4	Bit 2: Not used
bit1 = 2^1 = 2	Bit 1: Not used
bit0 = 2^0 = 1	Bit 0: Not used

Details

Set the sum of the values for bits to be enabled to the parameter, from the values 2^0 = 1, 2^1 = 2, 2^2 = 4, 2^3 = 8, 2^4 = 16, 2^5 = 32, 2^6 = 64, and 2^7 = 128, corresponding to the error event status enable register bits 0, 1, 2, 3, 4, 5, 6, and 7.

Example of Use

To enable the waveform pattern loading error event.

```
SYS SG
ESEEND 16
```

Related Command

ESEERR?	Error event status register query.

ESR0?

Extended End Event Status Register Query

Function

This command queries the extended end event status.

Query

```
ESR0?
```

Response

n

Parameter

n Extended End Event Status register

Value = bit0 + bit1 + ... + bit7

bit7 = 2^7 = 128	Bit 7: Not used
bit6 = 2^6 = 64	Bit 6: Not used
bit5 = 2^5 = 32	Bit 5: Not used
bit4 = 2^4 = 16	Bit 4: Not used
bit3 = 2^3 = 8	Bit 3: Not used
bit2 = 2^2 = 4	Bit 2: Not used
bit1 = 2^1 = 2	Bit 1: Not used
bit0 = 2^0 = 1	Bit 0: Signal Generator Function

Details

The response is the sum of the values 2^0 = 1, 2^1 = 2, 2^2 = 4, 2^3 = 8, 2^4 = 16, 2^5 = 32, 2^6 = 64, and 2^7 = 128, corresponding to the extended end event status register bits 0, 1, 2, 3, 4, 5, 6, and 7. When a response is read, the extended end event status register value is cleared.

Example of Use

To query the extended end event status register.

```
ESR0?
```

Related Command

`ESE0` Extended END event status enable register contents

ESR1?

Extended Error Event Status Register Query

Function

This command queries the extended error event status.

Query

```
ESR1?
```

Response

n

Parameter

n Extended Error Event Status register

Value = bit0 + bit1 + ... + bit7

bit7 = 2^7 = 128	Bit 7: Not used
bit6 = 2^6 = 64	Bit 6: Not used
bit5 = 2^5 = 32	Bit 5: Not used
bit4 = 2^4 = 16	Bit 4: Not used
bit3 = 2^3 = 8	Bit 3: Not used
bit2 = 2^2 = 4	Bit 2: Not used
bit1 = 2^1 = 2	Bit 1: Not used
bit0 = 2^0 = 1	Bit 0: Signal Generator Function

Details

The response is the sum of the values 2^0 = 1, 2^1 = 2, 2^2 = 4, 2^3 = 8, 2^4 = 16, 2^5 = 32, 2^6 = 64, and 2^7 = 128, corresponding to the extended error event status register bits 0, 1, 2, 3, 4, 5, 6, and 7. When a response is read, the extended error event status register value is cleared.

Example of Use

To query the extended error event status register.

```
ESR1?
```

Related Command

ESE1	Extended ERROR event status enable register contents

ESREND?

Event Status Register Query

Function

This command queries the end event status that is used for the Signal Generator.

Query

```
ESREND?
```

Response

n

Parameter

n End Event Status register

Value = bit0 + bit1 + ... + bit7

Signal Generator function

bit7 = 2^7 = 128 Bit 7: Not used
bit6 = 2^6 = 64 Bit 6: Not used
bit5 = 2^5 = 32 Bit 5: Completion of waveform pattern copy
bit4 = 2^4 = 16 Bit 4: Completion of waveform pattern loading to waveform memory
bit3 = 2^3 = 8 Bit 3: Not used
bit2 = 2^2 = 4 Bit 2: Not used
bit1 = 2^1 = 2 Bit 1: Not used
bit0 = 2^0 = 1 Bit 0: Not used

Details

The response is the sum of the values 2^0 = 1, 2^1 = 2, 2^2 = 4, 2^3 = 8, 2^4 = 16, 2^5 = 32, 2^6 = 64, and 2^7 = 128, corresponding to the error event status register bits 0, 1, 2, 3, 4, 5, 6, and 7. When a response is read, the end event status register value is cleared.

Example of Use

To query the end event status register for the Signal Generator function.

```
SYS SG
ESREND?
```

Related Command

ESEERR End event status enable register setting

ESRERR?

Error Event Status Register Query

Function

This command queries the error event status that is used for the Signal Generator function.

This command can be used for the currently active function.

Query

```
ESRERR?
```

Response

n

Parameter

n Error event status register

Value = bit0 + bit1 + ... + bit7

Signal Generator function

bit7 = 2^7 = 128	Bit 7: Not used
bit6 = 2^6 = 64	Bit 6: Not used
bit5 = 2^5 = 32	Bit 5: Waveform pattern copy error
bit4 = 2^4 = 16	Bit 4: Waveform pattern loading to waveform memory error
bit3 = 2^3 = 8	Bit 3: Not used
bit2 = 2^2 = 4	Bit 2: Not used
bit1 = 2^1 = 2	Bit 1: Not used
bit0 = 2^0 = 1	Bit 0: Not used

Details

The response is the sum of the values 2^0 = 1, 2^1 = 2, 2^2 = 4, 2^3 = 8, 2^4 = 16, 2^5 = 32, 2^6 = 64, and 2^7 = 128, corresponding to the error event status register bits 0, 1, 2, 3, 4, 5, 6, and 7. When a response is read, the error event status register value is cleared.

Example of Use

To query the error event status register for the Signal Generator function.

```
SYS SG
ESRERR?
```

Related Command

ESEERR	Error event status enable register setting

FILEVER?

File Version Query

Function

This command queries the waveform pattern file version on the hard disk.

Query

```
FILEVER? package,pattern
```

Response

```
version
```

Parameter

`package`	Package name (Character string)
`pattern`	Pattern name (Character string)
`version`	Version number

Example of Use

To query the "TEST" pattern version number of the package "WCDMA".

```
FILEVER? "WCDMA","TEST"
```

FIS/FIS?

Frequency - Step Value

Function

This command sets the fluctuation width (step value) when the frequency is increased/decreased in step.

Command

```
FIS freq
```

Query

```
FIS?
```

Response

```
freq
```

Parameter

`freq`		Frequency step width
	Range	0.01 Hz to 1 GHz
	Resolution	0.01 Hz
	Default	100 kHz
	Response unit	Hz
	Suffix code	`HZ`, `KHZ`, `KZ`, `MHZ`, `MZ`, `GHZ`, `GZ`

Example of Use

To set the frequency step width to 200 kHz

```
FIS 200KHZ
```

Related Command

`FRS`	Setting frequency by stepping up and down

FRAMECOUNT/FRAMECOUNT?

Frame Count

Function

This command sets the Frame Count from the Signal Generator option.

Command

```
FRAMECOUNT integer
```

Query

```
FRAMECOUNT?
```

Response

```
integer
```

Parameter

`integer`		Specifying the output frame count
	Range	1 to 32767
	Resolution	1
	Default	1

Example of Use

To set the output frame count to 10.

```
FRAMECOUNT 10
```

To query the Frame Count from the Signal Generator option.

```
FRAMECOUNT?
> 10
```

FREQ/FREQ?

Frequency

Function

This command sets frequency

Command

```
FREQ freq
```

Query

```
FREQ?
```

Response

```
freq
```

Parameter

`freq` Frequency

Range	250 MHz to 3.6 GHz (*) 250 MHz to 6 GHz (**)
Resolution	0.01 Hz
Default	1 GHz
Response unit	`Hz`
Suffix code	`HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ`
When omitted:	`Hz`

(*) When option 020/120 is installed.
(**) When option 021/121 is installed.

Example of Use

To set the frequency to 800 MHz

```
FREQ 800MHZ
```

FRS

Frequency Step Up/Down

Function

This command raises/lowers the frequency in a set width (step value).

Command

```
FRS up_down
```

Parameter

`up_down`	Fluctuation direction of the frequency step width
`UP`	Raises the frequency
`DN`	Lowers the frequency
`DOWN`	Lowers the frequency

Example of Use

To raise the frequency twice in the 200 kHz width.

```
FIS 200KHZ
FRS UP
FRS UP
```

Related Command

`FIS`	Sets the frequency step width.

HDDSPC?

Hard Disk Drive Size Query

Function

This command queries hard disk free space information.

Query

```
HDDSPC?
```

Response

```
total,blank
```

Parameter

`total` Total hard disk size

Response unit Byte

`blank` Hard disk free space

Response unit Byte

Example of Use

To query the hard disk size.

```
HDDSPC?
```

INI

Preset

Function

This command executes initialization.

Command

```
INI
```

Details

The application currently selected is the target.

Example of Use

To execute initialization

```
INI
```

Related Command

`PRE`	Same function as `INI`.
`*RST`	Initialization of all applications

LDCANCEL

Cancel Loading

Function

This command cancels loading waveform patterns to waveform memory.

Command

```
LDCANCEL
```

Example of Use

To cancel loading waveform patterns to waveform memory.

```
LDCANCEL
```

LDFILE/LDFILE?

Load Pattern File/Check Status of Lading Pattern and Waveform Memory

Function

This command starts loading the waveform pattern from the hard disk to the waveform memory. Load results and current status for the specified waveform pattern are returned in response to the query.

Command

```
LDFILE package,pattern
```

Query

```
LDFILE? package,pattern
```

Response

```
status
```

Parameter

`package`	Package name (Character string)	
`pattern`	Pattern name (Character string)	
`status`	Status	
	`EXIST`	Already loaded
	`ENABLE`	Can be loaded
	`NEED_LICENSE`	License required
	`NO_PATTERN_HDD`	No corresponding file
	`TOO_LARGE_SIZE`	Insufficient waveform memory free space
	`DISABLE_LOAD`	Internal error
	`INVALID_VERSION`	Version mismatch
	`FILE_ERROR`	Pattern file analysis error
	`WVI_FILE_ERROR`	Illegal pattern file (.wvi)
	`PATTERN_OVER_ON_WM`	Exceeded number of loadable waveform pattern files
	`PACKAGE_OVER_ON_WM`	Exceeded number of loadable packages
	`PATTERN_OVER_ON_PACKAGE`	Exceeded number of loadable waveform pattern files in 1 package

Details

If a waveform pattern is loaded when the same waveform pattern has already been loaded, the existing waveform pattern is overwritten.

Example of Use

To start loading "TEST" pattern in package "WCDMA".

```
LDFILE "WCDMA","TEST"
*OPC?                                   // Loaded when 1 is returned
```

Related Command

LDPAT	Same as LDFILE

LDPAT/LDPAT?

Load Pattern File/Check Status of Lading Pattern and Waveform Memory

Function

This command starts loading the waveform pattern from the hard disk to the waveform memory. Load results and current status for the specified waveform pattern are returned in response to the query.

Same function as LDFILE. Refer to the descriptions of LDFILE for details.

LOADEDFILENAME?

Loaded File Name in Waveform Memory

Function

This command queries the waveform pattern filename loaded in the waveform memory.

Query

```
LOADEDFILENAME? n
```

Response

```
package,pattern
```

Parameter

`n`		Random numbers allocated to waveform patterns.
	Range	0 to (Number of waveform patterns in the waveform memory − 1)
	Resolution	1
`package`		Package name (Character string)
`pattern`		Pattern name (Character string)

Example of Use

To query the waveform pattern filename loaded in the waveform memory.

`LOADEDFILENUM?`	Response > 3
`LOADEDFILENAME?`	`0`
`LOADEDFILENAME?`	`1`
`LOADEDFILENAME?`	`2`

Related Command

`LOADEDFILENUM?`	Querying the number of waveform pattern files in the waveform memory.

LOADEDFILENUM?

Number of Loaded Files Query

Function

This command queries the number of waveform pattern files loaded in the waveform memory.

Query

```
LOADEDFILENUM?
```

Response

n

Parameter

n		Number of waveform pattern files loaded to waveform memory
	Range	0 to 1000
	Resolution	1

Example of Use

To query the number of waveform pattern files loaded in the waveform memory.

```
LOADEDFILENUM?
> 3
```

Related Command

`PATNUM?`	Same as `LOADEDFILENUM?`

LOADEDFILESEL/LOADEDFILESEL?

Select Waveform File

Function

This selects the waveform pattern file to be played from the waveform pattern files loaded to the waveform memory.

Command

```
LOADEDFILESEL package,pattern
```

Query

```
LOADEDFILESEL?
```

Response

```
package,pattern
```

Parameter

`package`	Package name (Character string)
`NONE`	Waveform pattern file not selected
`pattern`	Pattern name (Character string)
`NONE`	Waveform pattern file not selected

Example of Use

To select loading "TEST" pattern in package "WCDMA".

```
LOADEDFILESEL "WCDMA","TEST"
```

Related Command

`PAT`	Same as `LOADEDFILESEL`

LVL/LVL?

RF Output - On/Off

Function

This command turns RF output ON/OFF.

Command

```
LVL on_off
```

Query

```
LVL?
```

Response

```
on_off
```

Parameter

`on_off`	RF Output
`ON`	On
`OFF`	Off

Example of Use

To set the RF signal output to Off.

```
LVL OFF
```

LVLACCSTT?

Level Accuracy Status Query

Function

This command queries the output level accuracy status.

Query

```
LVLACCSTT?
```

Response

```
status
```

Parameter

`status`	Output level accuracy status
`NORMAL`	Normal state
`UNLEVELED`	Outside performance assurance status

Example of Use

To query the output level accuracy status.

```
LVLACCSTT?
```

LVLCAL

SG Level Calibration

Function

This command calibrates the output level.

Command

```
LVLCAL
```

Example of Use

To calibrate the output level.

```
LVLCAL
```

LVLSTTLST?

Level Status List Query

Function

This command queries the output level status.

Query

```
LVLSTTLST?
```

Response

```
unit,offset,unleveled, INTALC,CONTOFF,
relative,NORMAL
```

Parameter

`unit`	Voltage display unit
`EMF`	Open circuit voltage
`TERM`	Termination voltage
`offset`	Level offset
`OFFSETON`	On
`OFFSETOFF`	Off
`unleveled`	Output level accuracy status
`NORMAL`	Normal state
`UNLEVELED`	Outside level accuracy assurance
`INTALC`	Fixed Value
`CONTOFF`	Fixed Value
`relative`	Relative output mode
`RELON`	On
`RELOFF`	Off
`NORMAL`	Fixed Value

Example of Use

To query the output level status.

```
LVLSTTLST?
```

MARKEREDIT/MARKEREDIT?

Marker Edit

Function

This command specifies the user setting mode for the external output marker.

Command

```
MARKEREDIT n,mode
```

Query

```
MARKEREDIT? n
```

Response

```
mode
```

Parameter

n	Marker type
1	Marker 1
2	Marker 2
3	Marker 3
mode	User setting mode
OFF	Outputs the marker previously recorded in the waveform pattern.
ON	Outputs the user setting marker.
PATSYNC	Outputs the marker at the start of the waveform pattern.

Details

OFF can only be specified if a waveform pattern that consists of 14-bit resolution IQ data is selected. If a 15-bit or 16-bit resolution waveform pattern is selected, the following restrictions apply:

15-bit resolution: Markers 2 and 3 cannot be set to OFF.
16-bit resolution: Markers 1 to 3 cannot be set to OFF.

Example of Use

To specify the user setting mode for marker 1.

```
MARKEREDIT 1,ON
```

MARKEREDITCYCLE/MARKEREDITCYCLE?

Marker Edit Mode Cycle Value

Function

This command sets the output pulse cycle when the external output marker is set to the user setting marker.

Command

```
MARKEREDITCYCLE n,cycle
```

Query

```
MARKEREDITCYCLE? n
```

Response

```
cycle
```

Parameter

n	Marker type
1	Marker 1
2	Marker 2
3	Marker 3
cycle	Output pulse cycle

Example of Use

To set Marker 1 to the user setting marker and set the output pulse cycle to 200.

```
1 : MARKEREDIT 1,ON
2 : MARKEREDITCYCLE 1,200
```

MARKEREDITOFFSET/MARKEREDITOFFSET?

Marker Edit Mode Start Offset Value

Function

This command sets the output pulse starting offset when the external output marker is set to the user setting marker.

Command

```
MARKEREDITOFFSET n,offset
```

Query

```
MARKEREDITOFFSET? n
```

Response

```
offset
```

Parameter

`n`	Marker type
`1`	Marker 1
`2`	Marker 2
`3`	Marker 3
`offset`	Starting offset value

Example of Use

To set Marker 1 to the user setting marker and set the output pulse starting offset to 100.

```
1 : MARKEREDIT 1,ON
2 : MARKEREDITOFFSET 1,100
```

MARKEREDITWIDTH/MARKEREDITWIDTH?

Marker Edit Mode Width Value

Function

This command sets the output pulse width when the external output marker is set to the user setting marker.

Command

```
MARKEREDITWIDTH n,width
```

Query

```
MARKEREDITWIDTH? n
```

Response

```
width
```

Parameter

n	Marker type
1	Marker 1
2	Marker 2
3	Marker 3
width	Pulse width

Example of Use

To set Marker 1 to the user setting marker and set the output pulse width to 50.

```
1 : MARKEREDIT 1,ON
2 : MARKEREDITWIDTH 1,50
```

MARKERPOL/MARKERPOL?

Marker Polarity

Function

This command sets the polarity of the external output marker signal.

Command

```
MARKERPOL n,polarity
```

Query

```
MARKERPOL? n
```

Response

```
polarity
```

Parameter

`n`	Marker type
`1`	Marker 1
`2`	Marker 2
`3`	Marker 3
`polarity`	Polarity
`POS`	Positive (Positive polarity)
`NEG`	Negative (Negative polarity)

Example of Use

To set the polarity of Marker 1 to negative.

```
MARKERPOL 1,NEG
```

MOD/MOD?

Modulation - On/Off

Function

This command sets the modulation function ON/OFF.

Command

```
MOD on_off
```

Query

```
MOD?
```

Response

```
on_off
```

Parameter

`on_off`	Modulation ON/OFF
`ON`	On
`OFF`	Off

Details

Fixed to OFF when no waveform pattern file is selected.

Example of Use

To set the modulation function to ON.

```
MOD ON
```

OIS/OIS?

Output Level - Set Value

Function

This command sets the numerical value fluctuation width (step value) when the output level is increased/decreased in step units.

Command

```
OIS level
```

Query

```
OIS?
```

Response

```
level
```

Parameter

`level`		Step width of the output level
	Range	0.01 to 100.00 dB
	Resolution	0.01 dB
	Default	
	Response unit	dB
	Suffix code	`DB`

Example of Use

To set the output level step width to 5.00 dB.

```
OIS 5.00DB
```

Related Command

`OLS`	Setting output level by stepping up and down

OLS

Level Set Up/Down

Function

This command increments or decrements the output level by a specified amount.

Command

```
OLS up_down
```

Parameter

`up_down`	Incrementing or decrementing the output level in step units
`UP`	Raises the output level
`DN`	Lowers the output level
`DOWN`	Lowers the output level

Example of Use

To raise the output level twice using 2.00 dB width.

```
OIS 2.00DB
OLS UP
OLS UP
```

Related Command

`OIS`	Sets the output level in step units.

OLU/OLU?

Level Unit

Function

This command sets the output level unit.

Command

```
OLU unit
```

Query

```
OLU?
```

Response

```
unit
```

Parameter

`unit`	Output level unit
`DBM`	dBm
`DBU`	dBμV

Example of Use

To set the level setting unit to dBm.

```
OLU DBM
```

OLVL/OLVL?

Output Level

Function

This command sets the output level.

Command

```
OLVL level
```

Query

```
OLVL? unit
```

Response

```
level
```

Parameter

`level` Output Level

Range	−40.00 dBm to +20.00 dBm (>25 MHz)(*) −40.00 dBm to +2.00 dBm (≤25 MHz)(*) −136.00 dBm to +15.00 dBm (>25 MHz)(**) −136.00 dBm to −3.00 dBm (≤25 MHz)(**)
Resolution	0.01 dB
Default	−40.00 dBm (*) −136.00 dBm (**)
Suffix code	`DBM`, `DBU`
When omitted:	`DBM`

(*) When option 022/122 is not installed.

(**) When option 022/122 is installed.

`unit` Output level unit (optional)

`DBM`	dBm
`DBU`	dBμV
When omitted:	dBm

Details

The range is based on an output level unit of dBm.

The range differs as follows according to the conditions:

When dBμV (Term) is set as the output level unit

Range + 106.99 dB

When dBμV (EMF) is set as the output level unit

Range + 113.01 dB

When Offset is on: Range + Offset Value

Example of Use

Setting the output level to –30.00 dBm

```
OLVL -30.00DBM
```

OOF/OOF?

Level Offset - On/Off

Function

This command sets the output level offset ON/OFF.

Command

```
OOF on_off
```

Query

```
OOF?
```

Response

```
on_off
```

Parameter

`on_off`	Output level offset
`ON`	On
`OFF`	Off

Example of Use

To enable the output level offset.

```
OOF ON
```

OOS/OOS?

Level Offset - Level

Function

This command sets the output level offset value

Command

```
OOS level
```

Query

```
OOS?
```

Response

```
level
```

Parameter

`level` Output level offset

Range	−100.00 to 100.00 dB
Resolution	0.01 dB
Default	0.00 dB
Response unit	dB
Suffix code	`DB`

Example of Use

To set the output level offset to –15.00 dB.

```
OOS -15.00DB
```

ORL/ORL?

Relative - On/Off

Function

This command sets the relative output level display ON/OFF.

Command

```
ORL on_off
```

Query

```
ORL?
```

Response

```
on_off
```

Parameter

`on_off`	Relative output level
`ON`	On
`OFF`	Off

Example of Use

To enable relative output level display.

```
ORL ON
```

ORLR?

Relative Level - Reference Level

Function

This command queries the reference output level at relative output level display mode (Output level when the relative display mode is set to ON).

Query

```
ORLR?
```

Response

```
level
```

Parameter

`level` Reference level of relative output

Range	−40.00 dBm to +20.00 dBm (>25 MHz) (*)
	−40.00 dBm to +2.00 dBm (≤25 MHz) (*)
	−136.00 dBm to +15.00 dBm (>25 MHz) (**)
	−136.00 dBm to −3.00 dBm (≤25 MHz) (**)
Resolution	0.01 dB
Response unit	dBm

(*) When option 022/122 is not installed.

(**) When option 022/122 is installed.

Details

The range is based on an output level unit of dBm.

The range differs as follows according to the conditions:

When dBμV (Term) is set as the output level unit

Range + 106.99 dB

When dBμV (EMF) is set as the output level unit

Range + 113.01 dB

When Offset is on: Range + Offset Value

Example of Use

To query reference level of relative output

```
OLVL -75.00DBM
ORL ON
ORLR?                Response> -75.00
```

ORLV/ORLV?

Relative Level

Function

This command sets the screen display output level at relative output level display mode.

Command

```
ORLV level
```

Query

```
ORLV?
```

Response

```
level
```

Parameter

`level` Relative output level

Range
60 dB width within the range of –60.00 dB to +60.00 dB (> 25 MHz)(*)
42 dB width within the range of –42.00 dB to +42.00 dB (≤ 25 MHz)(*)
151 dB width within the range of –151.00 dB to +151.00 dB (> 25 MHz)(**)
133 dB width within the range of –133.00 dB to +133.00 dB (≤ 25 MHz)(**)

Resolution 0.01 dB

Response unit dB

(*) When option 022/122 is not installed.

(**) When option 022/122 is installed.

Details

The range differs as follows according to the conditions:

When Offset is on: Range + Offset Value

Example of Use

To set the relative output to +10.00 dB based on an output level of −75.00 dBm.

```
OLVL -75.00DBM
ORL ON
ORLV 10.00DB
```

PAT

Select Waveform File

Function

This selects the waveform pattern file to be played from the waveform pattern files loaded to the waveform memory.

The function is the same as that of `LOADEDFILESEL`. Refer to the descriptions of `LOADEDFILESEL` for details.

PATNAME?

Loaded File Name in Waveform Memory

Function

This command queries the waveform pattern filename loaded in the waveform memory.

The function is the same as that of `LOADEDFILENAME?` Refer to the descriptions of `LOADEDFILENAME?` for details.

PATNUM?

Number of Loaded Files

Function

This command queries the number of waveform pattern filenames loaded in the waveform memory.

The function is the same as that of `LOADEDFILENUM?` Refer to the descriptions of `LOADEDFILENUM?` for details.

PATRUNSTT?

Pattern Running Status Query

Function

This command queries the running status of a waveform pattern.

Query

```
PATRUNSTT?
```

Response

```
status
```

Parameter

`status`	The waveform pattern running status
`STOP`	Stopped
`PLAY`	Running

Example of Use

To query the waveform pattern status.

```
PATRUNSTT?
```

PATWMPOWRATIO/PATWMPOWRATIO?

Power Ratio

Function

This command sets the output ratio of AWGN to carrier (C/N) when AWGN is ON.

Command

```
PATWMPOWRATIO level
```

Query

```
PATWMPOWRATIO?
```

Response

```
level
```

Parameter

`level`	C/N
Range	−40 to +40 dB
Resolution	0.01
Default	−40.00
Response unit	dB
Suffix code	`DB`

Details

The setting range may be narrowed if the RF output level is close to the upper or lower limit.

Example of Use

To set the C/N to 3 dB.

```
PATWMPOWRATIO 3DB
```

PMO/PMO?

Pulse Modulation Source

Function

This command sets the pulse modulation signal source.

Command

```
PMO source
```

Query

```
PMO?
```

Response

```
source
```

Parameter

`source`	Pulse modulation signal source.
`INT`	Internal signal
`EXT`	External input signal
`OFF`	No pulse modulation

Example of Use

To set the pulse modulation signal source to internal signal.

```
PMO INT
```

POWRATIOTARGET/POWRATIOTARGET?

Target of C/N Setting

Function

This command sets the parameters to be changed when C/N is set.

Command

```
POWRATIOTARGET target
```

Query

```
POWRATIOTARGET?
```

Response

```
target
```

Parameter

`target`	Parameter to be changed when C/N is set.
`CARRIER`	Carrier signal
`NOISE`	AWGN
`CONSTANT`	Fixed output level (Carrier + AWGN)

Example of Use

To set AWGN as the parameter to be changed when C/N is set.

```
POWRATIOTARGET NOISE
```

PRE

Preset

Function

This command executes initialization.

Command

```
PRE
```

Details

The application currently selected is the target.

Example of Use

To execute initialization

```
PRE
```

Related Command

`INI`	Same as `PRE`
`*RST`	Initializes all applications

REFCLKSRC/REFCLKSRC?

Baseband Reference Clock Source

Function

This command sets baseband signal reference clock.

Command

```
REFCLKSRC source
```

Query

```
REFCLKSRC?
```

Response

```
source
```

Parameter

`source`	Baseband signal reference clock
`INT`	Internal signal (Default)
`EXT`	External input signal

Example of Use

To set the baseband signal reference clock to external input signal.

```
REFCLKSRC EXT
```

REFCLKVAL/REFCLKVAL?

Baseband Reference Clock

Function

This command sets the baseband signal reference clock frequency in magnification ratio based on the sampling clock.

Command

```
REFCLKVAL clock
```

Query

```
REFCLKVAL?
```

Response

```
clock
```

Parameter

`clock`	Baseband signal reference clock
`SIXTEENTH`	Sampling Clock × 1/16
`EIGHTH`	Sampling Clock × 1/8
`QUARTER`	Sampling Clock × 1/4
`HALF`	Sampling Clock × 1/2
`1`	Sampling Clock × 1
`2`	Sampling Clock × 2
`4`	Sampling Clock × 4
`8`	Sampling Clock × 8
`16`	Sampling Clock × 16

The setting range is as shown in the following table.

Baseband reference clock setting range

Sampling Clock [MHz]	Baseband Reference Clock Setting								
	16	8	4	2	1	1/2	1/4	1/8	1/16
0.02≤f<0.024414062	✓	✓	✓	✓	✓				
0.024414062≤f<0.048828125	✓	✓	✓	✓	✓	✓			
0.048828125≤f<0.09765625	✓	✓	✓	✓	✓	✓	✓		
0.09765625≤f<0.1953125	✓	✓	✓	✓	✓	✓	✓	✓	
0.1953125≤f<2.5	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.5≤f<5		✓	✓	✓	✓	✓	✓	✓	✓
5≤f<10			✓	✓	✓	✓	✓	✓	✓
10≤f<20				✓	✓	✓	✓	✓	✓
20≤f<40					✓	✓	✓	✓	✓
40≤f<80						✓	✓	✓	✓
80≤f<160							✓	✓	✓

Example of Use

To set the baseband signal reference lock frequency to sampling clock ×2.

```
REFCLKVAL 2
```

SAMPLINGCLK?

Sampling Clock Query

Function

This command queries the baseband signal sampling clock.

Query

```
SAMPLINGCLK?
```

Response

```
freq
```

Parameter

`freq`	Sampling clock
Range	0.02 to 160 MHz
Resolution	0.001 Hz
Response unit	Hz

Example of Use

To query the sampling clock

```
SAMPLINGCLK?
```

SATRGOUT/SATRGOUT?

SA Trigger Out

Function

This command selects the type of the trigger to be output to the SG marker of SA/SPA.

Command

```
SATRGOUT triggertoSA
```

Query

```
SATRGOUT?
```

Response

```
triggertoSA
```

Parameter

`triggertoSA`	Output trigger
`MARKER1`	Marker 1
`MARKER2`	Marker 2
`MARKER3`	Marker 3
`PATSYNC`	A marker synchronized with the top of pattern

Example of Use

To select the type of the trigger to be output to the SG marker of SA/SPA.

```
SATRGOUT MARKER1
```

SFTGGENBUS

Remote Command Trigger

Function

This command triggers the output of waveform pattern. This becomes available when Trigger Source is BUS.

Commmand

```
SFTGGENBUS
```

Example of Use

To trigger the output of waveform pattern.

```
SFTGGENBUS
```

SFTRG/SFTRG?

External Trigger - On/Off

Function

This command sets the external trigger ON/OFF.

Command

```
SFTRG on_off
```

Query

```
SFTRG?
```

Response

```
on_off
```

Parameter

`on_off`	External trigger On/Off
`ON`	On
`OFF`	Off

Example of Use

To enable the external trigger.

```
SFTRG ON
```

SFTRGMODE/SFTRGMODE?

External Trigger - Mode

Function

This command sets the external trigger operation mode.

Command

```
SFTRGMODE mode
```

Query

```
SFTRGMODE?
```

Response

```
mode
```

Parameter

`mode`	External trigger operation mode.
`START`	Start trigger
`FRAME`	Frame trigger

Example of Use

To set the external trigger operation mode to start trigger.

```
SFTRG ON
SFTRGMODE START
```

SGWINDOWPOS/SGWINDOWPOS?

SG Window Position

Function

This command switches the display position of the Signal Generator screen.

Command

```
SGWINDOWPOS position
```

Query

```
SGWINDOWPOS?
```

Response

```
position
```

Parameter

`position`	Display position
`TOP`	Top
`BOTTOM`	Bottom

Example of Use

To display the Signal Generator screen at the bottom.

```
SGWINDOWPOS BOTTOM
```

SPREV/SPREV?

RF Spectrum - Reverse/Normal

Function

This command whether to invert spectrum of the output waveform (reverses I and Q).

Command

```
SPREV mode
```

Query

```
SPREV?
```

Response

```
mode
```

Parameter

`mode`	Whether to invert output waveform
`ON`	Reverse: Invert
`REV`	Reverse: Invert (command only)
`INV`	Normal: Invert (command only)
`OFF`	Normal: Do not invert (initial value)
`NORMAL`	Normal: Do not invert (command only)

Example of Use

To invert the output waveform.

```
SPREV ON
```

STDLYSRC/STDLYSRC?

Start Trigger Delay Source

Function

This command sets the signal source of the external trigger.

Command

```
STDLYSRC source
```

Query

```
STDLYSRC?
```

Response

```
source
```

Parameter

`source`	External trigger signal source
`EXTTRG`	External input signal
`KEY`	Trigger key input
`BUS`	Remote Command

Example of Use

To set the signal source of the external trigger to the external input signal.

```
STDLYSRC EXTTRG
```

STDLYSYM/STDLYSYM?

Start Trigger Delay

Function

This command sets the RF signal output timing in symbol or chip rate units of each system (determined by the overrate).

Command

```
STDLYSYM t
```

Query

```
STDLYSYM?
```

Response

```
t
```

Parameter

`t` Start trigger delay time

Range	Varies depending on the selected waveform pattern.
Resolution	Varies depending on the selected waveform pattern.
Default	`0`
Response unit	None (Symbol or chip)

Example of Use

To set the start trigger delay time to 30 chips.

```
STDLYSYM 30
```

STDLYTIME?

Start Trigger Delay Time Query

Function

This command queries a value computed by converting the output timing of RF signals into time.

Query

```
STDLYTIME?
```

Response

```
time
```

Parameter

`time` Start trigger delay time

Range	Varies depending on the selected waveform pattern.
Resolution	Varies depending on the selected waveform pattern.
Response unit	s

Example of Use

To query the output timing of the external trigger.

```
STDLYTIME?
> 6.50E-8
```

STGS/STGS?

External Trigger - Mode

Function

This command sets the external trigger operation mode.

Command

```
STGS mode
```

Query

```
STGS?
```

Response

```
mode
```

Parameter

`mode`	External trigger operation mode.
`INT`	Does not use external trigger (Default)
`EXTSTA`	Start trigger
`EXT`	Start trigger (Command only)
`EXTFRM`	Frame trigger

Example of Use

To set the external trigger operation mode to start trigger.

```
STGS EXTSTA
```

SYS/SYS?

Application Switch Command/Application Status Query

Function

This command sets the operation target (application) to the signal generator. The execution status of the specified application is returned in response to a query.

Command

```
SYS SG,window
```

Query

```
SYS? SG
```

Response

```
status,window
```

Parameter

`window`	Window status (optional)
`ACT`	Active (brought to front)
`INACT`	Inactive
`MIN`	Minimized
`NON`	No window displayed (response only)
When omitted	Same as `ACT`
`status`	Application status
`CURRENT`	Operation target
`IDLE`	Loaded but not executed
`RUN`	Executed but not targeted for operation
`UNLOAD`	Not loaded

Example of Use

To switch the operation target to the signal generator.

```
SYS SG,ACT
```

VDSPL/VDSPL?

Volt Unit Display

Function

This command sets the display method when the output level is set in voltage units.

Command

```
VDSPL unit
```

Query

```
VDSPL?
```

Response

```
unit
```

Parameter

`unit`	Voltage unit display system
`EMF`	Open circuit voltage display
`TERM`	Termination voltage display

Example of Use

To display the voltage units using open voltage.

```
VDSPL EMF
```

WMSPC?

Waveform Memory Space Query

Function

This command queries the waveform memory free space.

Query

```
WMSPC?
```

Response

```
blank,consecutive_blank,total
```

Parameter

`blank`	Free space (in byte)
`consecutive_blank`	Contiguous free space (in byte)
`total`	Total waveform memory size (in byte)

Example of Use

To query the waveform memory free space.