Keysight Wireless Test Set

This help file provides documentation for the following products:
E6640A EXM Wireless Test Set

V9064B VXA Measurement Applications User's & Programmer's Reference

KEYSIGHT TECHNOLOGIES

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Limit Test (SCPI Only) 902
Trigger 903
Free Run 903

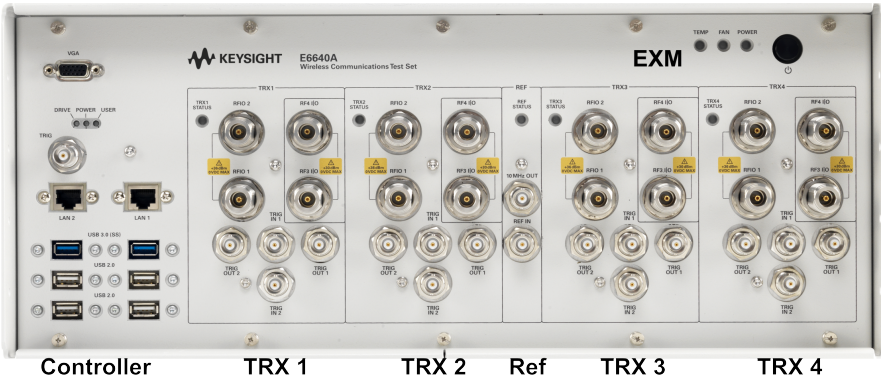
Video 903
Trigger Level 903
Trig Slope 903
Trig Delay 903
Trig Holdoff 903
Holdoff Type 903
External 1 903
Trigger Level 903
Trig Slope 903
Trig Delay 903
Trig Holdoff 903
Holdoff Type 903
Trig Reference Line 904
User Preset 905
User Preset 905
User Preset All Modes 906
Save User Preset 907
View/Display 908
Display 908
Annotation 908
Meas Bar On/Off 909
Screen 910
Active Function Values On/Off 910
Title 911
Change Title 911
Clear Title 912
Graticule 913
System Display Settings 913
Annotation Local Settings 913
Themes 914
Preset View: Demod Quad 915

1 About the Test Set

The X-Series E6640A EXM Wireless Test Set is a one-box tester consisting of instruments loaded into a M9018A PXI mainframe with a front impact cover. The mainframe has a common PC controller (located on the far left) and M9300A PXI Frequency Reference (located in the center of the rack). The test set has one to four Keysight M9430A TRX (transmit/receive) instruments installed.

Each TRX includes a signal analyzer and a signal source, both of which interface with the front panel of the test set through an input/output matrix, and is run by its own instance of the XSA firmware application (a fully loaded test set shows four independent XSA windows on its monitor display).

The E6640A can be configured to test cellular products with a standard 40 MHz of analysis bandwidth. It could also be configured to test Wireless products with 80 or 160 MHz of analysis bandwidth. If your requirement is to test both, the TRX instruments can be configured to test both products.



Installing Application Software

If you want to install a measurement application after your initial hardware purchase, you need only to license it. All of the available applications are loaded in your test set at the time of purchase.

Thus, when you purchase a new application, you will receive an entitlement certificate that you can use to obtain a license key for that application. To activate the new measurement application, enter the license key that you obtain into the test set.

For the latest information on Keysight X-series measurement applications and upgrade kits, visit the following internet URL.

http://www.keysight.com/find/e6640a

Viewing a License Key

Measurement applications that you purchased with your instrument have been installed and activated at the factory before shipment. The instrument requires a unique License Key for every measurement application purchased. The license key is a hexadecimal string that is specific to your measurement application, instrument model number and serial number. It enables you to install, or reactivate, that particular application.

Press **System**, **Show**, **System** to display the measurement applications that are currently licensed in your analyzer.

Go to the following location to view the license keys for the installed measurement applications:

C:\Program Files\Agilent\Licensing

You may want to keep a copy of your license key in a secure location. To do this, you can print out a copy of the display showing the license numbers. If you should lose your license key, call your nearest Keysight Technologies service or sales office for assistance.

Obtaining and Installing a License Key

If you purchase an additional application that requires installation, you will receive an "Entitlement Certificate", which may be redeemed for a license key for one instrument. To obtain your license key, follow the instructions that accompany the certificate.

Installing a license key for the selected application can be done automatically using a USB memory device. To do this, you copy the license file to the USB memory device, at the root level. Follow the instructions that come with your software installation kit.

Installing a license key can also be done manually using the built-in license management application, which may be found via the instrument front panel keys at **System**, **Licensing. . .** , or on-disk at:

C:\Programming Files\Agilent\Licensing

You can also use these procedures to reinstall a license key that has been accidentally deleted, or lost due to a memory failure.

Updating Measurement Application Software

All the software applications were loaded at the time of original instrument manufacture. It is a good idea to regularly update your software with the latest available version. This helps to ensure that you receive

any improvements and expanded functionality.

Because the software was loaded at the initial purchase, further additional measurement applications may now be available. If the application you are interested in licensing is not available, you will need to do a software update. (To display a list of installed applications, press **System**, **Show**, **System**.)

Check the appropriate page of the Keysight web site for the latest available software versions, according to the name of your instrument, as follows:

http://www.keysight.com/find/E6640A_software

You can load the updated software package into the analyzer either from a USB drive or directly from the internet. An automatic loading program is included with the files.

EXM Options and Accessories

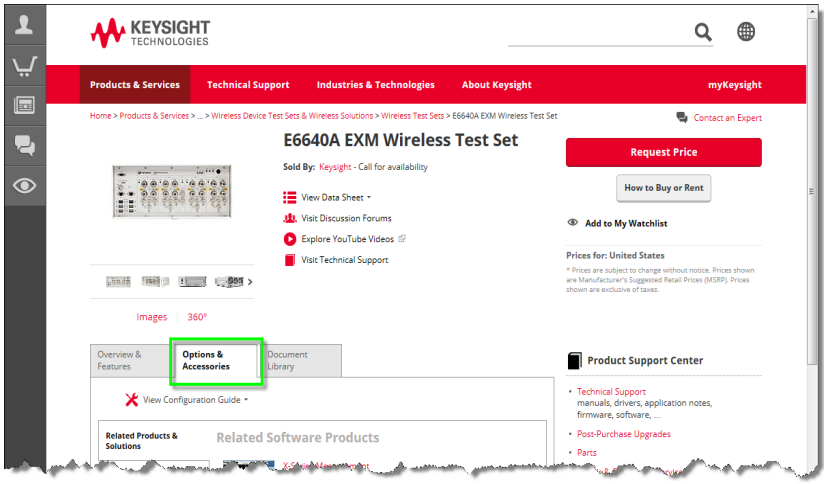
You can view an online list of available Options and Accessories for your instrument as follows:

1. Browse to one of the following URLs, according to the product name of your analyzer:

   www.keysight.com/find/e6640a

2. The home page for your instrument appears (in some cases, you may see an initial splash screen containing a button named View the Webpage, which you should click to display the home page).

3. Locate the **Options & Accessories** tab, as highlighted in the example below, which shows the home page for the E6640A.



4. Click the **Options & Accessories** tab, to display a list of available options and accessories for your instrument.

Front-Panel Features

The instrument Front-panel features are fully detailed in the section "Front-Panel Features" (under the chapter "Front and Rear Panel Features") of the document:

Latest available on line document: E6640A Getting Started Guide

Embedded PDF installed with the latest firmware revision:

If you are viewing this information as a Help file in the instrument, then you can click on the link above to open the PDF document.

Display Annotations

Display Annotations are fully detailed under the chapter "Front and Rear Panel Features" of the document:

Latest available on line document: E6640A Getting Started Guide

Embedded PDF installed with the latest firmware revision:

If you are viewing this information as a Help file in the instrument, then you can click on the links above to open the PDF document.

Rear-Panel Features

The instrument's Rear-panel features are fully detailed in the section "Rear-Panel Features" (under the chapter "Front and Rear Panel Features") of the document:

Latest available on line document: E6640A Getting Started Guide

Embedded PDF installed with the latest firmware revision:

If you are viewing this information as a Help file in the instrument, then you can click on the link above to open the PDF document.

Window Control Keys

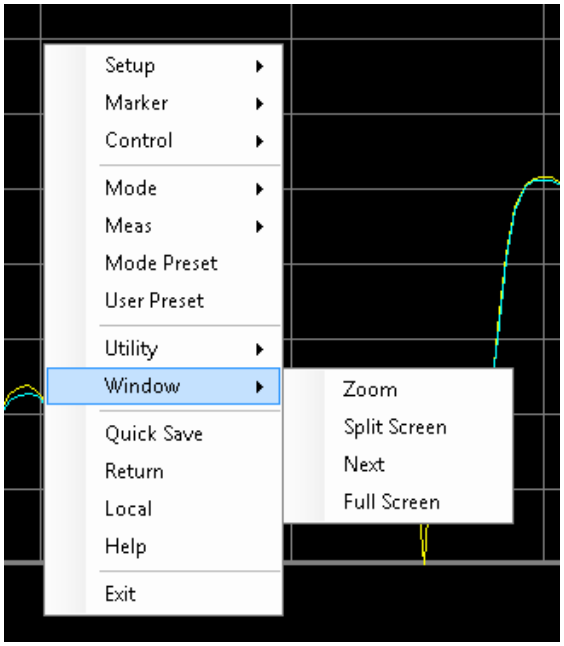
The instrument provides three virtual-front-panel keys or four menu items for controlling windows.

Virtual Front Panel

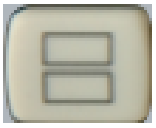
The virtual-front-panel keys are Multi Window, Zoom, and Next Window. These are all “immediate action” keys.

Windows Control Menu

The menu items are Zoom, Split Screen, Next [Window], and Full screen. These are all “immediate action” menu selections. Zoom and Full Screen are toggle functions.



Multi-Window



The Multi Window front-panel key will toggle you back and forth between the Normal View and the last Multi Window View (Zone Span, Trace Zoom or Spectrogram) that you were in, when using the Swept SA measurement of the Spectrum Analyzer Mode. It remembers which View you were in through a Preset. This “previous view” is set to Zone Span on a Restore Mode Defaults.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Zoom

Zoom is a toggle function. Pressing this key once increases the size of the selected window. Pressing the key again returns the window to the original size.

When Zoom is on for a window, that window will get the entire primary display area. The zoomed window, since it is the selected window, is outlined in green.

Zoom is local to each Measurement. Each Measurement remembers its Zoom state. The Zoom state of each Measurement is part of the Mode’s state.

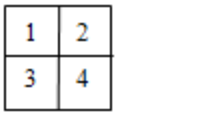
NOTE Data acquisition and processing for the other windows continues while a window is zoomed, as does all SCPI communication with the other windows.

Remote Command	`:DISPlay:WINDow:FORMat:ZOOM`
Remote Command	`:DISPlay:WINDow:FORMat:TILE`
Example	:DISP:WIND:FORM:ZOOM sets zoomed :DISP:WIND:FORM:TILE sets un-zoomed
Preset	TILE
Initial S/W Revision	Prior to A.02.00

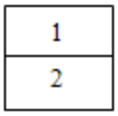
Next Window

Selects the next window of the current view.When the Next Window key is pressed, the next window in the order of precedencebecomes selected. If the selected window was zoomed, the next window will also be zoomed.

The window numbers are as follows. Note that these numbers also determine the order of precedence (that is, Next Window goes from 1 to 2, then 2 to 3, etc.):



Four window display



Two window display

RTSA measurements:

Only two windows are available in the Spectrogram view under the Spectrum measurement and up to three windows are available in the Power vs. Time measurement, depending on the view set up.

Remote Command	`:DISPlay:WINDow[:SELect] <number>` `:DISPlay:WINDow[:SELect]?`
Example	:DISP:WIND 1
Preset	1
Min	1
Max	If <number> is greater than the number of windows, limit to <number of windows>
Initial S/W Revision	Prior to A.02.00

One and only one window is always selected. The selected window has the focus; this means that all window-specific key presses apply only to that window. You can tell which window is selected by the thick green border around it. If a window is not selected, its boundary is gray.

If a window in a multi-window display is zoomed it is still outlined in green. If there is only one window, the green outline is not used. This allows the user to distinguish between a zoomed window and a display with only one window.

The selected window is local to each Measurement. Each Measurement remembers which window is selected. The selected window for each Measurement is remembered in Mode state.

NOTE When this key is pressed in Help Mode, it toggles focus between the table of contents window and the topic pane window.

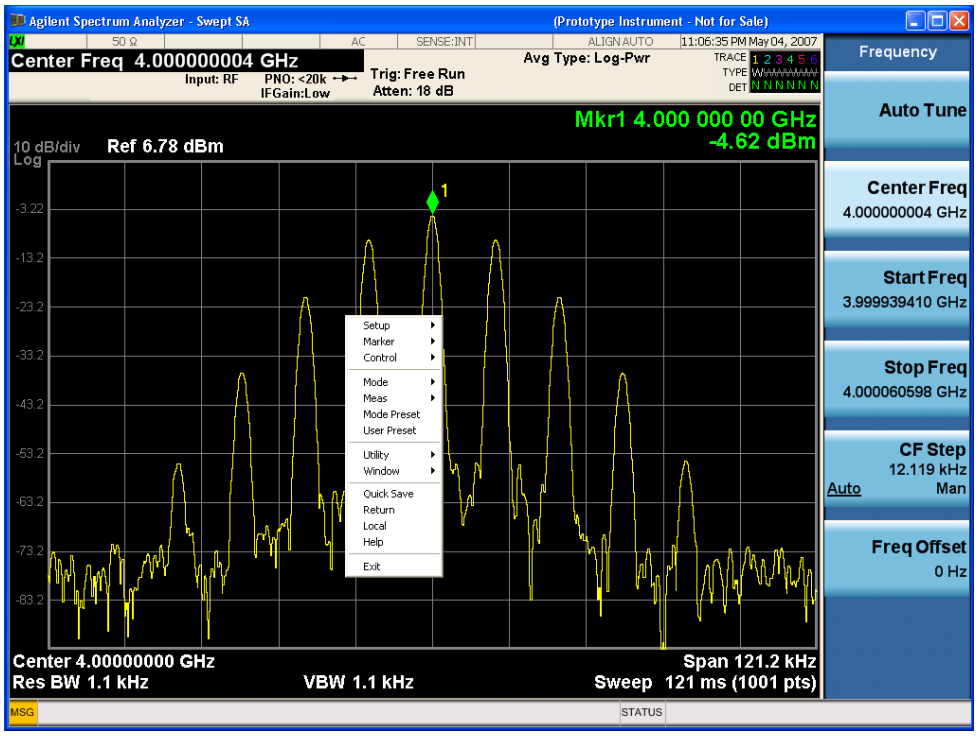
Mouse and Keyboard Control

If you do not have access to the instrument front-panel, there are several ways that a mouse and PC Keyboard can give you access to functions normally accessed using the front-panel keys.

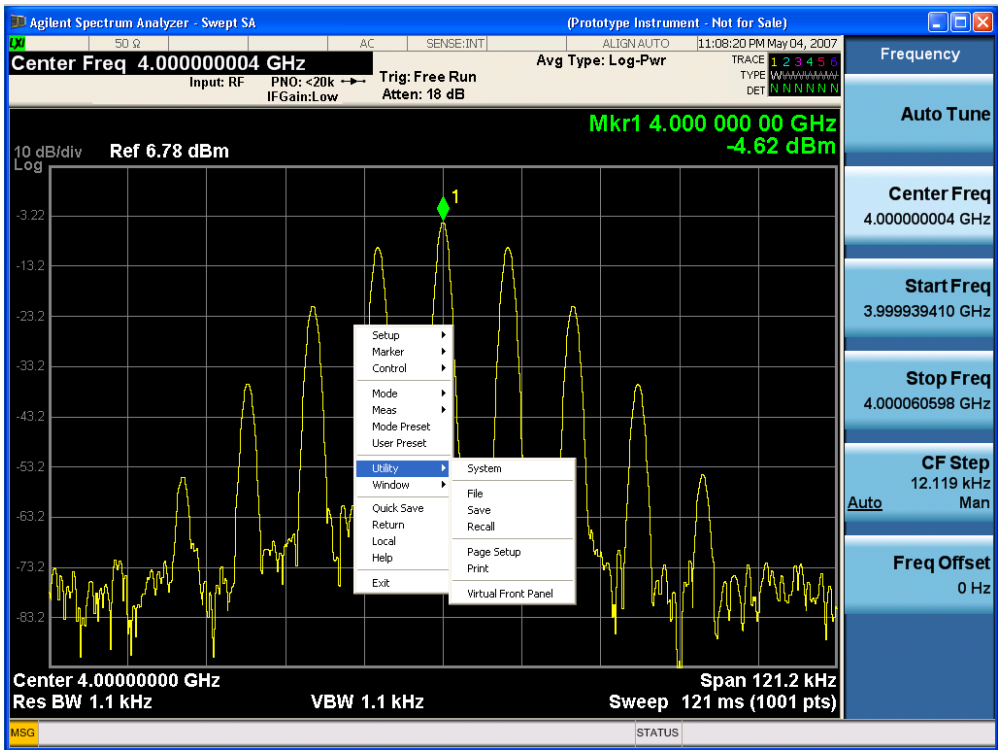
For instrument lacking a physical front panel display, you can watch the instrument display via external monitor or remote desktop connection

Right-Click

If you plug in a mouse and right-click on the analyzer screen, a menu will appear as below:

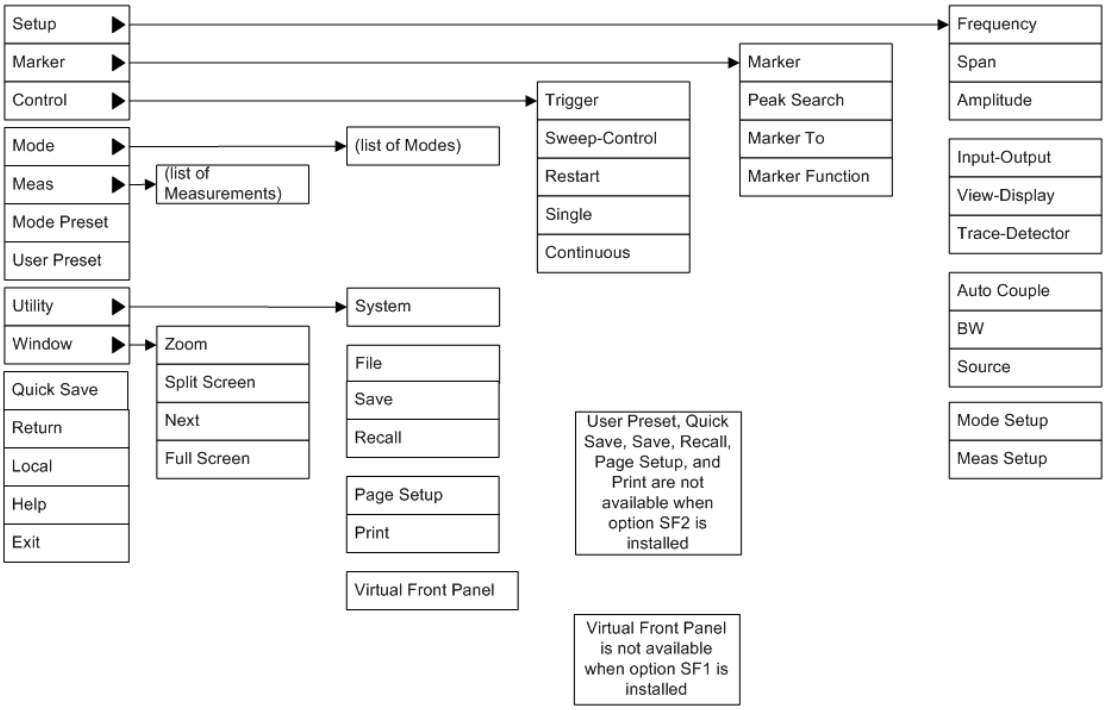


Placing the mouse on one of the rows marked with a right arrow symbol will cause that row to expand, as for example below where the mouse is hovered over the “Utility” row:



This method can be used to access any of the front-panel keys by using a mouse; as for example if you are accessing the instrument through Remote Desktop.

The array of keys thus available is shown below:



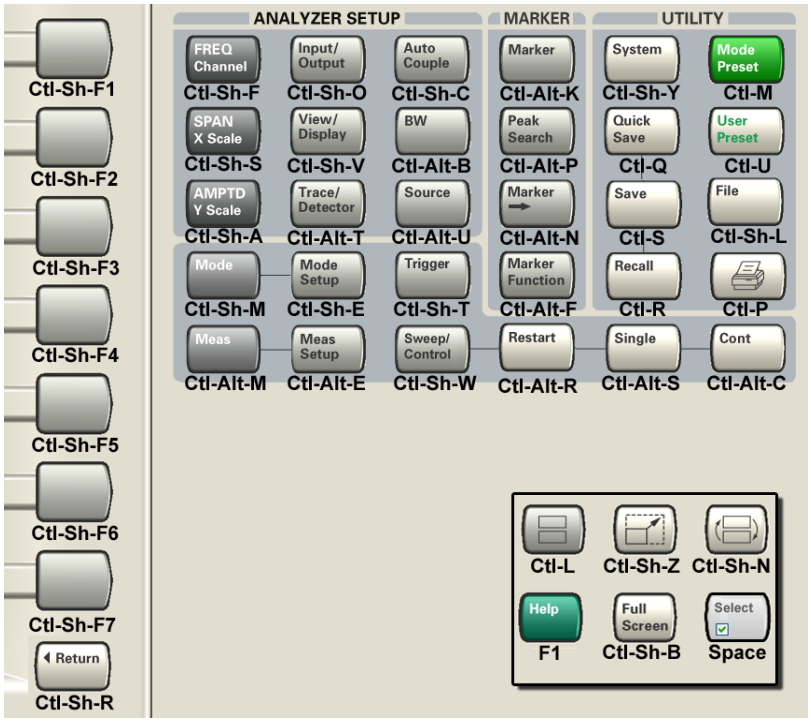
PC Keyboard

If you have a PC keyboard plugged in (or via Remote Desktop), certain key codes on the PC keyboard map to front-panel keys on the GPSA front panel. These key codes are shown below:

Front-panel key	Key code
Frequency	CTRL+SHIFT+F
Span	CTRL+SHIFT+S
Amplitude	CTRL+SHIFT+A
Input/Output	CTRL+SHIFT+O
View/Display	CTRL+SHIFT+V
Trace/Detector	CTRL+ALT+T
Auto Couple	CTRL+SHIFT+C
Bandwidth	CTRL+ALT+B
Source	CTRL+ALT-U
Marker	CTRL+ALT+K
Peak Search	CTRL+ALT+P
Marker To	CTRL+ALT+N
Marker Function	CTRL+ALT+F
System	CTRL+SHIFT+Y
Quick Save	CTRL+Q
Save	CTRL+S
Recall	CTRL+R
Mode Preset	CTRL+M
User Preset	CTRL+U
Print	CTRL+P
File	CTRL+SHIFT+L
Mode	CTRL+SHIFT+M
Measure	CTRL+ALT+M
Mode Setup	CTRL+SHIFT+E
Meas Setup	CTRL+ALT+E
Trigger	CTRL+SHIFT+T
Sweep/Control	CTRL+SHIFT+W
Restart	CTRL+ALT+R
Single	CTRL+ALT+S
Cont	CTRL+ALT+C
Zoom	CTRL+SHIFT+Z
Next Window	CTRL+SHIFT+N
Split Screen	CTRL+L

Front-panel key	Key code
Full Screen	CTRL+SHIFT+B
Return	CTRL+SHIFT+R
Mute	Mute
Inc Audio	Volume Up
Dec Audio	Volume Down
Help	F1
Control	CTRL
Alt	ALT
Enter	Return
Cancel	Esc
Del	Delete
Backspace	Backspace
Select	Space
Up Arrow	Up
Down Arrow	Down
Left Arrow	Left
Right Arrow	Right
Menu key 1	CTRL+SHIFT+F1
Menu key 2	CTRL+SHIFT+F2
Menu key 3	CTRL+SHIFT+F3
Menu key 4	CTRL+SHIFT+F4
Menu key 5	CTRL+SHIFT+F5
Menu key 6	CTRL+SHIFT+F6
Menu key 7	CTRL+SHIFT+F7
Backspace	BACKSPACE
Enter	ENTER
Tab	Tab
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
0	0

This is a pictorial view of the table:



Instrument Security & Memory Volatility

If you are using the instrument in a secure environment, you may need details of how to clear or sanitize its memory, in compliance with published security standards of the United States Department of Defense, or other similar authorities.

For X-Series test sets, this information is contained in the document "Security Features and Document of Volatility". This document is not included in the instrument on-disk library, but it may be downloaded from the Keysight web site.

To obtain a copy of the document, click on or browse to the following URL:

http://www.keysight.com/find/security

To locate and download the document, select Model Number, for example “E6607A”, then click "Submit". Then, follow the on-screen instructions to download the file.

2 About the VXA Signal Analyzer Measurement Application

This chapter provides overall information on the VXA Signal Analyzer Measurement Application and describes the measurements made by the analyzer.

What Does the VXA Signal Analyzer Application Do?

VXA is a full-featured vector signal analyzer that can help determine whether an RF modulated source or transmitter is working correctly. There are standard and optional measurements for complete analysis and demodulation of most communications signals.

The Vector Analysis measurement (included in Option IFP) provides:

- Spectrum analysis and Time Domain analysis with Signal Tracking
- Band Power, Occupied Bandwidth, and ACP measurements
- Markers, Marker Coupling, Triggering
- Time Gating
- Frequency Counter

The Analog Demodulation measurement (included in Option 1FP) will perform all the above and will also analyze and demodulate signals that use the following modulation formats:

- AM, FM, PM

The Digital Demodulation measurement (Option 2FP) will analyze and demodulate signals that use the following modulation formats:

- MSK
- QPSK
- 8PSK
- BPSK
- π/4 DQPSK
- DQPSK
- 3π/8 8PSK (EDGE)
- π/8 D8PSK
- D8PSK
- Offset QPSK
- QAM16, 32, 64, 128, 256, 512, 1024
- DVB QAM 16, 32, 64, 128, 256
- FSK 2, 4, 8, 16 states

- VSB8, VSB16
- APSK16, 32, 16 w/dub, 32 w/dub

Standard communications formats provided by Option 2FP include:

- Cellular: CDMA Base and Mobile, GSM, EDGE, CDPD, NADC, PDC, PHP, 3GPP (W-CDMA)
- Wireless Networking: WLAN (802.11b), HIPERLAN/1 (HBR and LBR), Bluetooth, ZigBee (802.15.4, 868/915/2450 MHz)
- Digital Video: DTV8, DTV16, DVB16, DVB32, DVB64, DVB128, DVB256, DVB 16APSK with code rates 2/3 to 9/10, DVB 32 APSK with code rates 3/4 to 9/10.
- Other: APCO 25, DECT, TETRA, VDL Mode 3

NOTE **For CDMA signals, VXA can analyze digital modulation for a single code channel only. If multiple code channels are transmitted, synchronization will fail, and incorrect EVM results will be obtained. For modulation quality measurements of multiple code channels, Modulation Accuracy and Code Domain measurements must be performed by a full-featured standard-based measurement application, such as N9073A for W-CDMA.**

2 About the Vector Signal Analyzer (VXA) Measurement Application

This chapter provides...

What Does the Vector Signal Analyzer (VXA) Application Do?

3 Programming the Test Set

This section provides introductory information about the programming documentation included with your product.

"What Programming Information is Available?" on page 48

"STATus Subsystem " on page 68

"Common Commands" on page 108

What Programming Information is Available?

The X-Series Documentation can be accessed through the Additional Documentation page in the instrument Help system. It can also be found online at: http://www.keysight.com/find/exm.

The following resources are available to help you create programs for automating your X-Series measurements:

Resource	Description
X-Series Programmer's Guide	Provides general SCPI programming information on the following topics: • Programming the X-Series Applications • Programming fundamentals • Programming examples Note that SCPI command descriptions for measurement applications are not in this book, but are in the User's and Programmer's Reference.
User's and Programmer's Reference manuals	Describes all front-panel keys and softkeys, including SCPI commands for a measurement application. Note that: • Each measurement application has its own User's and Programmer's Reference. • The content in this manual is duplicated in the analyzer's Help (the Help that you see for a key is identical to what you see in this manual).
Embedded Help in your instrument	Describes all front-panel keys and softkeys, including SCPI commands, for a measurement application. Note that the content that you see in Help when you press a key is identical to what you see in the User's and Programmer's Reference.
X-Series Getting Started Guide	Provides valuable sections related to programming including: • Licensing New Measurement Application Software - After Initial Purchase • Configuring instrument LAN Hostname, IP Address, and Gateway Address • Using the Windows XP Remote Desktop to connect to the instrument remotely • Using the Embedded Web Server Telnet connection to communicate SCPI This printed document is shipped with the instrument.
Keysight Application Notes	Printable PDF versions of pertinent application notes.
Keysight VISA User's Guide	Describes the Keysight Virtual Instrument Software Architecture (VISA) library and shows how to use it to develop I/O applications and instrument drivers on Windows PCs.

List of SCPI Commands

```
*CAL?
*CLS
*ESE <integer>
*ESE?
*ESR?
*IDN?
*OPC
*OPC?
*OPT?
*RCL <register#>
*RST
*SAV <register#>
*SRE <integer>
*SRE?
*STB?
*TRG
*TST?
*WAI
CALCulate:<meas>:DATA[1]|2|...|4:NAMes?
CALCulate:<meas>:MARKer:AOFF
CALCulate:<meas>:MARKer[1]|2|...|12:CFORmat RECTangular | POLar
CALCulate:<meas>:MARKer[1]|2|...|12:CFORmat?
CALCulate:<meas>:MARKer:COUPle[:STATe] OFF | ON | 0 | 1
CALCulate:<meas>:MARKer:COUPle[:STATe]?
CALCulate:<meas>:MARKer[1]|2|...|12:CPSearch[:STATe] ON | OFF | 1 | 0
CALCulate:<meas>:MARKer[1]|2|...|12:CPSearch[:STATe]?
CALCulate:<meas>:MARKer[1]|2|...|12:FCOunt[:STATe] OFF | ON | 0 | 1
CALCulate:<meas>:MARKer[1]|2|...|12:FCOunt[:STATe]?
CALCulate:<meas>:MARKer[1]|2|...|12:FCOunt:X?
CALCulate:<meas>:MARKer[1]|2|...|12:FUNCtion BPOWer | BDENsity | =OFF
CALCulate:<meas>:MARKer[1]|2|...|12:FUNCtion?
CALCulate:<meas>:MARKer[1]|2|...|12:FUNCtion:BAND:CENTer <real>
CALCulate:<meas>:MARKer[1]|2|...|12:FUNCtion:BAND:CENTer?
CALCulate:<meas>:MARKer[1]|2|...|12:FUNCtion:BAND:LEFT <real>
CALCulate:<meas>:MARKer[1]|2|...|12:FUNCtion:BAND:LEFT?
CALCulate:<meas>:MARKer[1]|2|...|12:FUNCtion:BAND:RIGHt <real>
CALCulate:<meas>:MARKer[1]|2|...|12:FUNCtion:BAND:RIGHt?
CALCulate:<meas>:MARKer[1]|2|...|12:FUNCtion:BAND:SPAN <real>
CALCulate:<meas>:MARKer[1]|2|...|12:FUNCtion:BAND:SPAN?
CALCulate:<meas>:MARKer[1]|2|...|12:FUNCtion:BDENsity:CTYPe MEAN | RMS
CALCulate:<meas>:MARKer[1]|2|...|12:FUNCtion:BDENsity:CTYPe?
CALCulate:<meas>:MARKer[1]|2|...|12:FUNCtion:BPOWer:CTYPe MEAN | RMS
CALCulate:<meas>:MARKer[1]|2|...|12:FUNCtion:BPOWer:CTYPe?
CALCulate:<meas>:MARKer[1]|2|...|12:MAXimum
CALCulate:<meas>:MARKer[1]|2|...|12:MAXimum:LEFT
CALCulate:<meas>:MARKer[1]|2|...|12:MAXimum:NEXT
CALCulate:<meas>:MARKer[1]|2|...|12:MAXimum:PREVious
CALCulate:<meas>:MARKer[1]|2|...|12:MAXimum:RIGHt
CALCulate:<meas>:MARKer[1]|2|...|12:MINimum
CALCulate:<meas>:MARKer[1]|2|...|12:MODE POSition | DELTa | FIXed | =OFF
```

```
CALCulate:<meas>:MARKer[1]|2|...|12:MODE?
CALCulate:<meas>:MARKer[1]|2|...|12:REFerence <integer>
CALCulate:<meas>:MARKer[1]|2|...|12:REFerence?
CALCulate:<meas>:MARKer:TABLe[:STATe] OFF | ON | 0 | 1
CALCulate:<meas>:MARKer:TABLe[:STATe]?
CALCulate:<meas>:MARKer[1]|2|...|12:TRACe <integer>
CALCulate:<meas>:MARKer[1]|2|...|12:TRACe?
CALCulate:<meas>:MARKer[1]|2|...|12:X <real>
CALCulate:<meas>:MARKer[1]|2|...|12:X?
CALCulate:<meas>:MARKer[1]|2|...|12[:X]:POSition <real>
CALCulate:<meas>:MARKer[1]|2|...|12[:X]:POSition?
CALCulate:<meas>:MARKer[1]|2|...|12:X:UNIT?
CALCulate:<meas>:MARKer[1]|2|...|12:Y:IMAGinary <real>
CALCulate:<meas>:MARKer[1]|2|...|12:Y:IMAGinary?
CALCulate:<meas>:MARKer[1]|2|...|12:Y[:REAL] <real>
CALCulate:<meas>:MARKer[1]|2|...|12:Y[:REAL]?
CALCulate:<meas>:MARKer[1]|2|...|12:Y:UNIT?
CALCulate:<meas>:MARKer[1]|2|...|12:Z <real>
CALCulate:<meas>:MARKer[1]|2|...|12:Z?
CALCulate:<meas>:MARKer[1]|2|...|12:Z:UNIT?
CALCulate:<meas>:TRACe[1]
|2|...|4:ACPower:CARRier:BANDwidth|BWIDth:INTegration <bandwidth>
CALCulate:<meas>:TRACe[1]
|2|...|4:ACPower:CARRier:BANDwidth|BWIDth:INTegration?
CALCulate:<meas>:TRACe[1]|2|...|4:ACPower:CARRier:FILTer:RRC:ALPHa <real>
CALCulate:<meas>:TRACe[1]|2|...|4:ACPower:CARRier:FILTer:RRC:ALPHa?
CALCulate:<meas>:TRACe[1]|2|...|4:ACPower:CARRier:FILTer:RRC:STATe OFF |
ON | 0 | 1
CALCulate:<meas>:TRACe[1]|2|...|4:ACPower:CARRier:FILTer:RRC:STATe?
CALCulate:<meas>:TRACe[1]|2|...|4:ACPower:CARRier:FREQuency <freq>
CALCulate:<meas>:TRACe[1]|2|...|4:ACPower:CARRier:FREQuency?
CALCulate:<meas>:TRACe[1]|2|...|4:ACPower:OFFSet:FILTer:RRC:STATe OFF | ON
| 0 | 1
CALCulate:<meas>:TRACe[1]|2|...|4:ACPower:OFFSet:FILTer:RRC:STATe?
CALCulate:<meas>:TRACe[1]
|2|...|4:ACPower:OFFSet:LIST:BANDwidth|BWIDth:INTegration <bandwidth>, ...
CALCulate:<meas>:TRACe[1]
|2|...|4:ACPower:OFFSet:LIST:BANDwidth|BWIDth:INTegration?
CALCulate:<meas>:TRACe[1]|2|...|4:ACPower:OFFSet:LIST:FILTer:RRC:ALPHa
<real>, ...
CALCulate:<meas>:TRACe[1]|2|...|4:ACPower:OFFSet:LIST:FILTer:RRC:ALPHa?
CALCulate:<meas>:TRACe[1]|2|...|4:ACPower:OFFSet:LIST:FREQuency <freq>,
...
CALCulate:<meas>:TRACe[1]|2|...|4:ACPower:OFFSet:LIST:FREQuency?
CALCulate:<meas>:TRACe[1]|2|...|4:ACPower:OFFSet:LIST:RCARrier <reall>,
...
CALCulate:<meas>:TRACe[1]|2|...|4:ACPower:OFFSet:LIST:RCARrier?
CALCulate:<meas>:TRACe[1]|2|...|4:ACPower:OFFSet:LIST:RCARrier:TEST OFF |
ON | 0 | 1, ...
CALCulate:<meas>:TRACe[1]|2|...|4:ACPower:OFFSet:LIST:RCARrier:TEST?
CALCulate:<meas>:TRACe[1]|2|...|4:ACPower:OFFSet:LIST:STATe OFF | ON | 0 |
1, ...
```

```
CALCulate:<meas>:TRACe[1]|2|...|4:ACPower:OFFSet:LIST:STATe?
CALCulate:<meas>:TRACe[1]|2|...|4:ACPower:STATe OFF | ON | 0 | 1
CALCulate:<meas>:TRACe[1]|2|...|4:ACPower:STATe?
CALCulate:<meas>:TRACe[1]|2|...|4:LIMit:VISible OFF | ON | 0 | 1
CALCulate:<meas>:TRACe[1]|2|...|4:LIMit:VISible?
CALCulate:<meas>:TRACe[1]|2|...|4:OBWidth:CENTroid?
CALCulate:<meas>:TRACe[1]|2|...|4:OBWidth:LIMit:FBLimit <freq>
CALCulate:<meas>:TRACe[1]|2|...|4:OBWidth:LIMit:FBLimit?
CALCulate:<meas>:TRACe[1]|2|...|4:OBWidth:LIMit[:TEST] OFF | ON | 0 | 1
CALCulate:<meas>:TRACe[1]|2|...|4:OBWidth:LIMit[:TEST]?
CALCulate:<meas>:TRACe[1]|2|...|4:OBWidth:PERCent <real>
CALCulate:<meas>:TRACe[1]|2|...|4:OBWidth:PERCent?
CALCulate:<meas>:TRACe[1]|2|...|4:OBWidth:STATe OFF | ON | 0 | 1
CALCulate:<meas>:TRACe[1]|2|...|4:OBWidth:STATe?
CALCulate:CLIMits:FAIL?
CALCulate:DATA<n>:COMPress? BLOCk | CFIT | MAXimum | MINimum | MEAN |
DMEan | RMS | RMSCubed | SAMPle | SDEViation | PPHase[, <soffset>[,
<length>[, <roffset>[, <rlimit>]]]]
CALCulate:DATA[n]?
CALCulate:DATA[1]|2|...|6:PEAKs? <threshold>, <excursion>[, AMPLitude |
FREQuency | TIME]
CALCulate:DATA[1]|2|...|6:PEAKs? <threshold>, <excursion>[, AMPLitude |
FREQuency | TIME[, ALL | GTDLine | LTDLine]]
CALCulate:DATA:REGister:ALL:REMove
CALCulate:DATA:REGister[1]|2|...|6:EMPTy?
CALCulate:DATA:REGister[1]|2|...|6:REMove
CALCulate:DDEMod:IQRotation <real>
CALCulate:DDEMod:IQRotation?
CALCulate:DDEMod:NORMalize OFF | ON | 0 | 1
CALCulate:DDEMod:NORMalize:?
CALCulate:DDEMod:PPSYmbol:COUPle OFF | ON | 0 | 1
CALCulate:DDEMod:PPSYmbol:COUPle?
CALCulate:FPOWer:POWer[1,2,...,999]?
CALCulate:FPOWer:POWer[1,2,...,999]:CONFigure
CALCulate:FPOWer:POWer[1,2,...,999]:DEFine "configurationstring"
CALCulate:FPOWer:POWer[1,2,...,999]:DEFine?
CALCulate:FPOWer:POWer[1,2,...,999]:FETCh?
CALCulate:FPOWer:POWer[1,2,...,999]:INITiate
CALCulate:FPOWer:POWer[1,2,...,999]:READ1?
CALCulate:FPOWer:POWer[1,2,...,999]:READ?
CALCulate:FPOWer:POWer[1,2,...,999]:READ2?
CALCulate:FPOWer:POWer[1,2,...,999]:RESet
CALibration[:ALL]
CALibration[:ALL]?
CALibration[:ALL]:NPENding
CALibration:EXPired?
CALibration:IF
CALibration:IF?
CALibration:IF:NPENding
CALibration:INTernal:SOURce[:ALL]
CALibration:INTernal:SOURce[:ALL]?
CALibration:INTernal:SOURce[:ALL]:NPENding
```

```
CALibration:NRF
CALibration:NRF?
CALibration:NRF:NPENding
CALibration:RF
CALibration:RF?
CALibration:RF:NPENding
CALibration:TEMPerature:CURRent?
CALibration:TEMPerature:LALL?
CALibration:TEMPerature:LIF?
CALibration:TEMPerature:LRF?
CALibration:TEMPerature:SOURce:LALL?
CALibration:TIME:LALL?
CALibration:TIME:LIF?
CALibration:TIME:LRF?
CALibration:TIME:SOURce:LALL?
CONF FSC
CONFigure?
CONFigure:ADEMod
CONFigure:ADEMod
CONFigure:ADEMod:NDEFault
CONFigure:DDEMod
CONFigure:DDEMod
CONFigure:DDEMod:NDEFault
CONFigure:VECTor
CONFigure:VECTor
CONFigure:VECTor:NDEFault
COUPle ALL | NONE
DISPlay:<meas>:AFPoints OFF | ON | 0 | 1
DISPlay:<meas>:AFPoints?
DISPlay:<meas>:FANNotation CSPan | SSTop
DISPlay:<meas>:FANNotation?
DISPlay:<meas>:TRACe[1]|2|...|4:COPY D1 | D2 | D3 | D4 | D5 | D6
DISPlay:<meas>:TRACe[1]|2|...|4:DDEMod:ALIN?
DISPlay:<meas>:TRACe[1]|2|...|4:DDEMod:ALINe OFF | ON | 0 | 1
DISPlay:<meas>:TRACe[1]|2|...|4:DDEMod:EYE:COUNt <real>
DISPlay:<meas>:TRACe[1]|2|...|4:DDEMod:EYE:COUNt?
DISPlay:<meas>:TRACe[1]|2|...|4:DDEMod:SYMBol BARS | DOTS | OFF
DISPlay:<meas>:TRACe[1]|2|...|4:DDEMod:SYMBol?
DISPlay:<meas>:TRACe[1]|2|...|4:DDEMod:SYMBol:FORMat HEXadecimal | BINary
DISPlay:<meas>:TRACe[1]|2|...|4:DDEMod:SYMBol:FORMat?
DISPlay:<meas>:TRACe[1]|2|...|4:DDEMod:SYMBol:SHAPe CIRCle | CROSs | OFF
DISPlay:<meas>:TRACe[1]|2|...|4:DDEMod:SYMBol:SHAPe?
DISPlay:<meas>:TRACe[1]|2|...|4:DDEMod:SYMBol:SIZE <real>
DISPlay:<meas>:TRACe[1]|2|...|4:DDEMod:SYMBol:SIZE?
DISPlay:<meas>:TRACe[1]|2|...|4:DDEMod:UNIT:FREQuency CARRier | HZ
DISPlay:<meas>:TRACe[1]|2|...|4:DDEMod:UNIT:FREQuency?
DISPlay:<meas>:TRACe[1]|2|...|4:DDEMod:UNIT:TIME SEC | SYMBol
DISPlay:<meas>:TRACe[1]|2|...|4:DDEMod:UNIT:TIME?
DISPlay:<meas>:TRACe[1]|2|...|4:FEED <string>
DISPlay:<meas>:TRACe[1]|2|...|4:FEED?
DISPlay:<meas>:TRACe[1]|2|...|4:FORMat MLOG | MLINear | REAL | IMAGinary |
VECTor | CONS | PHASe | UPHase | IEYE | QEYE | TRELlis | GDELay |
MLGLinear
```

```
DISPlay:<meas>:TRACe[1]|2|...|4:FORMat?
DISPlay:<meas>:TRACe[1]|2|...|4:FORMat:DELay:APERture <real>
DISPlay:<meas>:TRACe[1]|2|...|4:FORMat:DELay:APERture?
DISPlay:<meas>:TRACe[1]|2|...|4:FORMat:PHASe:OFFSet <real>
DISPlay:<meas>:TRACe[1]|2|...|4:FORMat:PHASe:OFFSet?
DISPlay:<meas>:TRACe[1]|2|...|4:FORMat:PHASe:UNWRap:REFerence <real>
DISPlay:<meas>:TRACe[1]|2|...|4:FORMat:PHASe:UNWRap:REFerence?
DISPlay:<meas>:TRACe[1]|2|...|4:RLINe OFF | ON | 0 |
1:DISPlay:<meas>:TRACe[1] | 2 | ... | 4:RLINe?
DISPlay:<meas>:TRACe[1]|2|...|4:VHCenter <real>
DISPlay:<meas>:TRACe[1]|2|...|4:VHCenter?
DISPlay:<meas>:TRACe[1]|2|...|4:X[:SCALe]:COUPle OFF | ON | 0 | 1
DISPlay:<meas>:TRACe[1]|2|...|4:X[:SCALe]:COUPle?
DISPlay:<meas>:TRACe[1]|2|...|4:X[:SCALe]:RLEVel <real>
DISPlay:<meas>:TRACe[1]|2|...|4:X[:SCALe]:RLEVel?
DISPlay:<meas>:TRACe[1]|2|...|4:X[:SCALe]:RPOSition LEFT | CENTer | RIGHt
DISPlay:<meas>:TRACe[1]|2|...|4:X[:SCALe]:RPOSition?
DISPlay:<meas>:TRACe[1]|2|...|4:X[:SCALe]:SPAN <real>
DISPlay:<meas>:TRACe[1]|2|...|4:X[:SCALe]:SPAN?
DISPlay:<meas>:TRACe[1]|2|...|4:Y:LRATio <real>
DISPlay:<meas>:TRACe[1]|2|...|4:Y:LRATio?
DISPlay:<meas>:TRACe[1]|2|...|4:Y[:SCALe]:AUTO:ONCE
DISPlay:<meas>:TRACe[1]|2|...|4:Y[:SCALe]:PDIVision <real>
DISPlay:<meas>:TRACe[1]|2|...|4:Y[:SCALe]:PDIVision?
DISPlay:<meas>:TRACe[1]|2|...|4:Y[:SCALe]:RLEVel <real>
DISPlay:<meas>:TRACe[1]|2|...|4:Y[:SCALe]:RLEVel?
DISPlay:<meas>:TRACe[1]|2|...|4:Y[:SCALe]:RLEVel:AUTO OFF | ON | 0 | 1
DISPlay:<meas>:TRACe[1]|2|...|4:Y[:SCALe]:RLEVel:AUTO?
DISPlay:<meas>:TRACe[1]|2|...|4:Y[:SCALe]:RPOSition TOP | CENTer | BOTTom
DISPlay:<meas>:TRACe[1]|2|...|4:Y[:SCALe]:RPOSition?
DISPlay:<meas>:TRACe[1]|2|...|4:Y:UNIT?
DISPlay:<meas>:TRACe[1]|2|...|4:Y:UNIT:PREFerence AUTO | PEAK | RMS |
POWer | MRMS
DISPlay:<meas>:TRACe[1]|2|...|4:Y:UNIT:PREFerence?
DISPlay:<meas>:WINDow:FORMat SINGle | TWO | TRI | QUAD | GR2X3 | GR3X2
DISPlay:<meas>:WINDow:FORMat SINGle | TWO | TRI | QUAD
DISPlay:<meas>:WINDow:FORMat?
DISPlay:<meas>:WINDow:FORMat?
DISPlay:<measurement>:ANNotation:TITLe:DATA <string>
DISPlay:<measurement>:ANNotation:TITLe:DATA?
DISPlay:ACTivefunc[:STATe] ON | OFF | 1 | 0
DISPlay:ACTivefunc[:STATe]?
DISPlay:ADEMod:TRACe[1]|2|...|4:CARRier:FREQuency?
DISPlay:ADEMod:VIEW:PRESet DSPectrum | STATistics
DISPlay:ANNotation:MBAR[:STATe] OFF | ON | 0 | 1
DISPlay:ANNotation:MBAR[:STATe]?
DISPlay:ANNotation:SCReen[:STATe] OFF | ON | 0 | 1
DISPlay:ANNotation:SCReen[:STATe]?
DISPlay:DDEMod:VIEW:PRESet QUAD
DISPlay:VECTor:VIEW:PRESet SPECtrum | STATistics
DISPlay:WINDow[1]:ANNotation[:ALL] OFF | ON | 0 | 1
DISPlay:WINDow[1]:ANNotation[:ALL]?
DISPlay:WINDow:FORMat:TILE
```

```
DISPlay:WINDow:FORMat:ZOOM
DISPlay:WINDow[:SELect] <number>
DISPlay:WINDow[:SELect]?
DISPlay:WINDow[1]:TRACe:GRAticule:GRID[:STATe] OFF | ON | 0 | 1
DISPlay:WINDow[1]:TRACe:GRAticule:GRID[:STATe]?
FEED:RF:PORT:OUTP RFIO1
FETCh:ADEMod[n]?
FETCh:DDEMod[n]?
FETCh:VECTor[n]?
FORMat:BORDer NORMal | SWAPped
FORMat:BORDer?
FORMat[:TRACe][:DATA] ASCii | INTeger, 32 | REAL, 32 | REAL, 64
FORMat[:TRACe][:DATA]?
GLOBal:DEFault
GLOBal:FREQuency:CENTer[:STATe] 1 | 0 | ON | OFF
GLOBal:FREQuency:CENTer[:STATe]?
HCOPy:ABORt
HCOPy[:IMMediate]
INITiate:ADEMod
INITiate:CONTinuous OFF | ON | 0 | 1
INITiate:CONTinuous?
INITiate:DDEMod
INITiate[:IMMediate]
INITiate:RESTart
INITiate:VECTor
INPut<1|2>:TYPE INPUT1 | INPUT2
INPut<1|2>:TYPE?
INPut[1]|2:LISN:FILTer:HPAS[:STATe] ON | OFF
INPut[1]|2:LISN:FILTer:HPAS[:STATe]?
INPut[1]|2:LISN:PEARth GROunded | FLOating
INPut[1]|2:LISN:PEARth?
INPut[1]|2:LISN:PHASe L1 | L2 | L3 | N
INPut[1]|2:LISN:PHASe?
INPut[1]|2:LISN[:TYPE] FOURphase | ESH2Z5 | ENV216 | OFF
INPut[1]|2:LISN[:TYPE]?
INPut:MIXer EXTernal | INTernal
INPut:MIXer?
INST:NSEL 102
INST:NSEL 105
INSTrument:CATalog?
INSTrument:COUPle:DEFault
INSTrument:COUPle:FREQuency:CENTer ALL | NONE
INSTrument:COUPle:FREQuency:CENTer?
INSTrument:NSELect <integer>
INSTrument:NSELect?
INSTrument[:SELect] GSM
INSTrument[:SELect] SANalyzer
INSTrument[:SELect] 'SA' | 'PNOISE' | 'EDGE' | 'GSM' | 'BASIC'
INSTrument[:SELect] SA | RTSA | SEQAN | EMI | BASIC | WCDMA | EDGEGSM |
WIMAXOFDMA | VSA | PNOISE | NFIGure | ADEMOD | BTooth | TDSCDMA | CDMA2K |
CDMA1XEV | LTE | LTETDD | LTEAFDD | LTEATDD | MSR | DVB | DTMB | DCATV |
```

```
ISDBT | CMMB | WLAN | CWLAN | CWIMAXOFDM | WIMAXFIXED | IDEN | RLC |
SCPILC | VSA89601
INSTrument[:SELect] RECeiver
INSTrument[:SELect]?
INST:SEL SCPILC
INST:SEL LTE
INST:SEL EMI
INST:SEL LTETDD
MEASure:DDEMod[n]?
MMEMory:CATalog? [<directory_name>]
MMEMory:CDIRectory [<directory_name>]
MMEMory:CDIRectory?
MMEMory:COPY <string>, <string>[, <string>, <string>]
MMEMory:COPY:DEVice <source_string>, <dest_string>
MMEMory:DATA <file_name>, <data>
MMEMory:DATA? <file_name>
MMEMory:DELete <file_name>[, <directory_name>]
MMEMory:HEADer:ID? "<filename>"
MMEMory:LOAD:SEQuences:| SLISt | ALISt | SAAList | "MySequence.txt"
MMEMory:LOAD:STATe 1, <filename>
MMEMory:LOAD:STATe <filename>
MMEMory:LOAD:TRACe:DATA D1 | D2 | D3 | D4 | D5 | D6, <filename>[, CSV |
TXT | SDF | MAT4 | MAT | HDF5 | BIN]
MMEMory:MDIRectory <directory_name>
MMEMory:MOVE <string>, <string>[, <string>, <string>]
MMEMory:RDIRectory <directory_name>
MMEMory:REGister:STATe:LABel <regnumber>, "label"
MMEMory:REGister:STATe:LABel? <regnumber>
MMEMory:STORe:SCReen <filename>
MMEMory:STORe:SCReen:THEMe TDColor | TDMonochrome | FCOLor | FMONochrome
MMEMory:STORe:SCReen:THEMe?
MMEMory:STORe:STATe 1, <filename>
MMEMory:STORe:STATe <filename>
MMEMory:STORe:TRACe:DATA TRACE1 | TRACE2 | TRACE3 | TRACE4 | TRACE5 |
TRACE6, "<filename>"[, CSV | TXT | SDF | MAT4 | MAT | HDF5 | BIN[, OFF |
ON | 0 | 1]]
MMEM:STOR:SEQuences:| SLISt | ALISt | SAAList | SSTep"MySequence.txt"
OUTPut[:EXTernal][:STATe] ON | OFF | 1 | 0
OUTPut[:EXTernal][:STATe]?
OUTPut:MODulation[:STATe] ON | OFF | 1 | 0
OUTPut:MODulation[:STATe]?
READ:ADEMod[n]?
READ:DDEMod[n]?
READ:VECTor[n]?
[:SENSe]:<meas>:AVERage:COUNt <integer>
[:SENSe]:<meas>:AVERage:COUNt?
[:SENSe]:<meas>:AVERage:FAST OFF | ON | 0 | 1
[:SENSe]:<meas>:AVERage:FAST?
[:SENSe]:<meas>:AVERage:FAST:URATe <integer>
[:SENSe]:<meas>:AVERage:FAST:URATe?
[:SENSe]:<meas>:AVERage:FAST:URATe:AUTO OFF | ON | 0 | 1
[:SENSe]:<meas>:AVERage:FAST:URATe:AUTO?
```

```
[:SENSe]:<meas>:AVERage[:STATe] OFF | ON | 0 | 1
[:SENSe]:<meas>:AVERage[:STATe]?
[:SENSe]:<meas>:AVERage:TCONtrol EXPonential | REPeat
[:SENSe]:<meas>:AVERage:TCONtrol?
[:SENSe]:<meas>:AVERage:TYPE RMS | TIME | MAXimum
[:SENSe]:<meas>:AVERage:TYPE?
[:SENSe]:<meas>:BANDwidth|BWIDth[:RESolution] <bandwidth>
[:SENSe]:<meas>:BANDwidth|BWIDth[:RESolution]?
[:SENSe]:<meas>:BANDwidth|BWIDth[:RESolution]:COUPle SPAN | MIN | FIXed
[:SENSe]:<meas>:BANDwidth|BWIDth[:RESolution]:COUPle?
[:SENSe]:<meas>:FFT:WINDow[:TYPE] UNIForm | HANNing | GAUSsian | FLATtop
[:SENSe]:<meas>:FFT:WINDow[:TYPE]?
[:SENSe]:<meas>:SWEep:EGATe:DELay <time>
[:SENSe]:<meas>:SWEep:EGATe:DELay?
[:SENSe]:<meas>:SWEep:EGATe[:SPAN] <time>
[:SENSe]:<meas>:SWEep:EGATe[:SPAN]?
[:SENSe]:<meas>:SWEep:EGATe:STATe OFF | ON | 0 | 1
[:SENSe]:<meas>:SWEep:EGATe:STATe?
[:SENSe]:<meas>:SWEep:POINts <integer>
[:SENSe]:<meas>:SWEep:POINts?
[:SENSe]:<meas>:SWEep:POINts:AUTO OFF | ON | 0 | 1
[:SENSe]:<meas>:SWEep:POINts:AUTO?
[:SENSe]:<meas>:SWEep:TIME <time>
[:SENSe]:<meas>:SWEep:TIME?
[:SENSe]:ADEMod:AM:UNIT AM | PCT
[:SENSe]:ADEMod:AM:UNIT?
[:SENSe]:ADEMod:CARRier:FREQuency:AUTO OFF | ON | 0 | 1
[:SENSe]:ADEMod:CARRier:FREQuency:AUTO?
[:SENSe]:ADEMod:CARRier:PHASe:AUTO OFF | ON | 0 | 1
[:SENSe]:ADEMod:CARRier:PHASe:AUTO?
[:SENSe]:ADEMod:MODulation AM | FM | PM
[:SENSe]:ADEMod:MODulation?
[:SENSe]:CORRection:BTS[:RF]:GAIN <rel_ampl>
[:SENSe]:CORRection:BTS[:RF]:GAIN?
[:SENSe]:CORRection:BTS[:RF]:LOSS <rel_ampl>
[:SENSe]:CORRection:BTS[:RF]:LOSS?
[:SENSe]:CORRection:CSET:ALL:DELete
[:SENSe]:CORRection:CSET:ALL[:STATe] ON | OFF | 1 | 0
[:SENSe]:CORRection:CSET:ALL[:STATe]?
[:SENSe]:CORRection:CSET[1]:ANTenna[:UNIT] GAUSs | PTESla | UVM | UAM | UA
| NOConversion
[:SENSe]:CORRection:CSET[1]:ANTenna[:UNIT]?
[:SENSe]:CORRection:CSET[1]|2|...|8:COMMent "text"
[:SENSe]:CORRection:CSET[1]|2|...|8:COMMent?
[:SENSe]:CORRection:CSET[1]|2|...|8:DATA <freq>, <ampl>, ...
[:SENSe]:CORRection:CSET[1]|2|...|8:DATA?
[:SENSe]:CORRection:CSET[1]|2|...|8:DATA:MERGe <freq>, <ampl>, ...
[:SENSe]:CORRection:CSET[1]|2|...|6:DELete
[:SENSe]:CORRection:CSET[1]|2|...|8:DESCription "text"
[:SENSe]:CORRection:CSET[1]|2|...|8:DESCription?
[:SENSe]:CORRection:CSET[1]|2|...|8:RF:PORT RFIN | RFIO1 | RFIO2 | RFOut |
GPSout | GNSSout | RFIO3 | RFIO4
[:SENSe]:CORRection:CSET[1]|2|...|8:RF:PORT?
```

```
[:SENSe]:CORRection:CSET[1]|2|...|8:RF:PORT:RFIO2 SOURce | ANALyzer | BOTH
[:SENSe]:CORRection:CSET[1]|2|...|8:RF:PORT:RFIO1 SOURce | ANALyzer | BOTH
[:SENSe]:CORRection:CSET[1]|2|...|8:RF:PORT:RFIO2?
[:SENSe]:CORRection:CSET[1]|2|...|8:RF:PORT:RFIO1?
[:SENSe]:CORRection:CSET[1]|2|...|8[:STATe] ON | OFF | 1 | 0
[:SENSe]:CORRection:CSET[1]|2|...|8[:STATe]?
[:SENSe]:CORRection:CSET[1]|2|...|8:X:SPACing LINear | LOGarithmic
[:SENSe]:CORRection:CSET[1]|2|...|8:X:SPACing?
[:SENSe]:CORRection:FEQualizer OFF | NORMal | INVert
[:SENSe]:CORRection:FEQualizer?
[:SENSe]:CORRection:FEQualizer:REGister D1 | D2 | D3 | D4 | D5 | D6
[:SENSe]:CORRection:FEQualizer:REGister?
[:SENSe]:CORRection:FEQualizer:RELative?
[:SENSe]:CORRection:IMPedance[:INPut][:MAGNitude] 50 | 75
[:SENSe]:CORRection:IMPedance[:INPut][:MAGNitude]?
[:SENSe]:CORRection:MS[:RF]:GAIN <rel_ampl>
[:SENSe]:CORRection:MS[:RF]:GAIN?
[:SENSe]:CORRection:MS[:RF]:LOSS <rel_ampl>
[:SENSe]:CORRection:MS[:RF]:LOSS?
[:SENSe]:CORRection:OFFSet[:MAGNitude]
[:SENSe]:CORRection:SA[:RF]:GAIN <rel_ampl>
[:SENSe]:CORRection:SA[:RF]:GAIN?
[:SENSe]:DDEMod:ALPHa <real>
[:SENSe]:DDEMod:ALPHa?
[:SENSe]:DDEMod:APSK:R3Ratio <real>
[:SENSe]:DDEMod:APSK:R2Ratio <real>
[:SENSe]:DDEMod:APSK:R2Ratio?
[:SENSe]:DDEMod:APSK:R3Ratio?
[:SENSe]:DDEMod:CADJust <real>
[:SENSe]:DDEMod:CADJust?
[:SENSe]:DDEMod:CPMIndex I12I13 | I7I10 | I6I7 | I5I6 | I4I5 | MSK | HCPM
[:SENSe]:DDEMod:CPMIndex?
[:SENSe]:DDEMod:CPMIndex:AUTO ON | OFF | 1 | 0
[:SENSe]:DDEMod:CPMIndex:AUTO?
[:SENSe]:DDEMod:EQUalization:CONVergence <real>
[:SENSe]:DDEMod:EQUalization:CONVergence?
[:SENSe]:DDEMod:EQUalization:FLENgth <integer>
[:SENSe]:DDEMod:EQUalization:FLENgth?
[:SENSe]:DDEMod:EQUalization:HOLD OFF | ON | 0 | 1
[:SENSe]:DDEMod:EQUalization:HOLD?
[:SENSe]:DDEMod:EQUalization:RESet
[:SENSe]:DDEMod:EQUalization:STATe OFF | ON | 0 | 1
[:SENSe]:DDEMod:EQUalization:STATe?
[:SENSe]:DDEMod:FILTer:MEASurement NONE | RRCosine | GAUSsian | EDGE |
IS95EQ | RECTangle | LPASs | USER
[:SENSe]:DDEMod:FILTer:MEASurement?
[:SENSe]:DDEMod:FILTer:REFerence RCOSine | RRCosine | GAUSsian | EDGE |
IS95BB | RECTangle | HSINe | USER | F1REC | F3RC
[:SENSe]:DDEMod:FILTer:REFerence?
[:SENSe]:DDEMod:FSK:DEViation:REFerence <freq>
[:SENSe]:DDEMod:FSK:DEViation:REFerence?
[:SENSe]:DDEMod:FSK:DEViation:REFerence:AUTO OFF | ON | 0 | 1
[:SENSe]:DDEMod:FSK:DEViation:REFerence:AUTO?
```

```
[:SENSe]:DDEMod:LSNR OFF | ON | 0 | 1
[:SENSe]:DDEMod:LSNR?
[:SENSe]:DDEMod:MODulation BPSK | QPSK | OQPSK | PI4DQPSK | DQPSK | PSK8 |
PI8DPSK8 | DPSK8 | QAM16 | QAM32 | QAM64 | QAM128 | QAM256 | QAM512 |
QAM1024 | FSK2 | FSK4 | FSK8 | FSK16 | MSK1 | MSK2 | EDGE | APSK16 |
APSK32 | DVBAPSK16 | DVBAPSK32 | DVBQAM16 | DVBQAM32 | DVBQAM64 |
DVBQAM128 | DVBQAM256 | VSB8 | VSB16 | CPMFM
[:SENSe]:DDEMod:MODulation?
[:SENSe]:DDEMod:PPSYmbol <integer>
[:SENSe]:DDEMod:PPSYmbol?
[:SENSe]:DDEMod:SRATe <frequency>
[:SENSe]:DDEMod:SRATe?
[:SENSe]:DDEMod:STANdard:PRESet CDMABTS | CDMAMS | CDPD | EDGE | GSM |
NADC | PDC | PHS | WCDMA | BLUETOOTH | HIPERLANHBR | HIPERLANLBR | WLAN11B
| ZIGBEE2450 | ZIGBEE868 | ZIGBEE915 | DTV8 | DTV16 | DVB16 | DVB32 |
DVB64 | DVB128 | DVB256 | DVB16APSK23 | DVB16APSK34 | DVB16APSK45 |
DVB16APSK56 | DVB16APSK89 | DVB16APSK910 | DVB32APSK34 | DVB32APSK45 |
DVB32APSK56 | DVB32APSK89 | DVB32APSK910 | APCO | DECT | TETRA | VDL3 |
HCPM | HDQPSK | MILSTDCPM | WS2F50K1 | WS2F100K1 | WS2F100K05 | WS2F150K05
| WS2F200K1 | WS2F200K05 | WS2F300K05
[:SENSe]:DDEMod:SWEep:POINts <integer>
[:SENSe]:DDEMod:SWEep:POINts?
[:SENSe]:DDEMod:SYNC:BURSt:STATe OFF | ON | 0 | 1
[:SENSe]:DDEMod:SYNC:BURSt:STATe?
[:SENSe]:DDEMod:SYNC:SLENgth <time>
[:SENSe]:DDEMod:SYNC:SLENgth?
[:SENSe]:DDEMod:SYNC:SWORd:OFFSet <integer>
[:SENSe]:DDEMod:SYNC:SWORd:OFFSet?
[:SENSe]:DDEMod:SYNC:SWORd:PATTern <string>
[:SENSe]:DDEMod:SYNC:SWORd:PATTern?
[:SENSe]:DDEMod:SYNC:SWORd:STATe OFF | ON | 0 | 1
[:SENSe]:DDEMod:SYNC:SWORd:STATe?
[:SENSe]:FEED RF | AIQ | EMIXer
[:SENSe]:FEED AREFerence
[:SENSe]:FEED IQ | IONLy | QONLy
[:SENSe]:FEED?
[:SENSe]:FEED?
[:SENSe]:FEED:RF:PORT[:INPut] RFIN | RFIN2 | RFIO1 | RFIO2 | RFIO3 | RFIO4
[:SENSe]:FEED:RF:PORT[:INPut]?
[:SENSe]:FEED:RF:PORT:OUTPut RFOut | RFIO1 | RFIO2 | GPSout | GNSSout |
RFIO3 | RFIO4
[:SENSe]:FEED:RF:PORT:OUTPut?
[:SENSe]:FREQuency:CENTer <freq>
[:SENSe]:FREQuency:CENTer?
[:SENSe]:FREQuency:CENTer:STEP:AUTO OFF | ON | 0 | 1
[:SENSe]:FREQuency:CENTer:STEP:AUTO?
[:SENSe]:FREQuency:CENTer:STEP[:INCRement] <freq>
[:SENSe]:FREQuency:CENTer:STEP[:INCRement]?
[:SENSe]:FREQuency:SPAN <freq>
[:SENSe]:FREQuency:SPAN?
[:SENSe]:FREQuency:SPAN:FULL
[:SENSe]:FREQuency:STARt <freq>
```

```
[:SENSe]:FREQuency:STARt?
[:SENSe]:FREQuency:STOP <freq>
[:SENSe]:FREQuency:STOP?
[:SENSe]:HDUPlex:PORT:INPut RFIO3 | RFIO4
[:SENSe]:HDUPlex:PORT:OUTPut RFIO3 | RFIO4
[:SENSe]:POWer[:RF]:RANGe <real>
[:SENSe]:POWer[:RF]:RANGe?
[:SENSe]:ROSCillator:EXTernal:FREQuency <freq>
[:SENSe]:ROSCillator:EXTernal:FREQuency?
[:SENSe]:ROSCillator:SOURce INTernal | EXTernal
[:SENSe]:ROSCillator:SOURce?
[:SENSe]:ROSCillator:SOURce:TYPE INTernal | EXTernal | SENSe | PULSe
[:SENSe]:ROSCillator:SOURce:TYPE?
[:SENSe]:SPECtrum NORMal | INVert
[:SENSe]:SPECtrum?
[:SENSe]:VECTor|ADEMod:FREQuency:CENTer:TRACk OFF | ON | 0 | 1
[:SENSe]:VECTor|ADEMod:FREQuency:CENTer:TRACk?
SOURce:AM[:DEPTh][:LINear]
SOURce:AM[:DEPTh][:LINear]?
SOURce:AM:INTernal:FREQuency
SOURce:AM:INTernal:FREQuency?
SOURce:AM:STATe
SOURce:AM:STATe?
SOURce:FM[:DEViation]
SOURce:FM[:DEViation]?
SOURce:FM:INTernal:FREQuency
SOURce:FM:INTernal:FREQuency?
SOURce:FM:STATe
SOURce:FM:STATe?
SOURce:FREQuency:CHANnels:BAND NONE | PGSM | EGSM | RGSM | DCS1800 |
PCS1900 | TGSM810 | GSM450 | GSM480 | GSM700 | GSM850 | BANDI | BANDII |
BANDIII | BANDIV | BANDV | BANDVI | BANDVII | BANDVIII | BANDIX | BANDX |
BANDXI | BANDXII | BANDXIII | BANDXIV | BANDXIX | USCELL | USPCS | JAPAN |
KOREAN | NMT | IMT2K | UPPER | SECOND | PAMR400 | PAMR800 | IMTEXT |
PCS1DOT9G | AWS | US2DOT5G | PUBLIC | LOWER | BAND1 | BAND2 | BAND3 |
BAND4 | BAND5 | BAND6 | BAND7 | BAND8 | BAND10 | BAND11 | BAND12 | BAND13
| BAND14 | BAND17 | BAND18 | BAND19 | BAND20 | BAND21 | BAND24 | BAND25 |
BAND26 | BAND27 | BAND28 | BAND31 | BAND33 | BAND34 | BAND35 | BAND36 |
BAND37 | BAND38 | BAND39 | BAND40 | BAND41 | BAND42 | BAND43 | BAND44 |
BANDA | BANDB | BANDC | BANDD | BANDE | BANDF
SOURce:FREQuency:CHANnels:BAND?
SOURce:FREQuency:CHANnels:NUMBer <int>
SOURce:FREQuency:CHANnels:NUMBer?
SOURce:FREQuency[:CW] <freq>
SOURce:FREQuency[:CW]?
SOURce:FREQuency:OFFSet <freq>
SOURce:FREQuency:OFFSet?
SOURce:FREQuency:REFerence <freq>
SOURce:FREQuency:REFerence?
SOURce:FREQuency:REFerence:SET
SOURce:FREQuency:REFerence:STATe OFF | ON | 0 | 1
SOURce:FREQuency:REFerence:STATe?
```

```
SOURce:LIST:INITiation:ARMed?
SOURce:LIST:NUMBer:STEPs <integer>
SOURce:LIST:NUMBer:STEPs?
SOURce:LIST:SETup:AMPLitude  <ampl>, <ampl>, <ampl>, ...
SOURce:LIST:SETup:AMPLitude?
SOURce:LIST:SETup:CLEar
SOURce:LIST:SETup:CNFRequency <double>, <double>, <double>, ...
SOURce:LIST:SETup:CNFRequency?
SOURce:LIST:SETup:DURation:TYPE <enum>, <enum>, <enum>, ...
SOURce:LIST:SETup:DURation:TYPE?
SOURce:LIST:SETup:INPut:TRIGger <enum>, <enum>, <enum>, ...
SOURce:LIST:SETup:INPut:TRIGger?
SOURce:LIST:SETup:OUTPut:TRIGger  ?
SOURce:LIST:SETup:OUTPut:TRIGger  <bool>, <bool>, <bool>, ...
SOURce:LIST:SETup:RADio:BAND <enum>, <enum>, <enum>, ...
SOURce:LIST:SETup:RADio:BAND?
SOURce:LIST:SETup:RADio:BAND:LINK <enum>, <enum>, <enum>, ...
SOURce:LIST:SETup:RADio:BAND:LINK?
SOURce:LIST:SETup:TOCount <time/int>, <time/int>, <time/int>, ...
SOURce:LIST:SETup:TOCount?
SOURce:LIST:SETup:TRANsition:TIME <time>, <time>, <time>, ...
SOURce:LIST:SETup:TRANsition:TIME?
SOURce:LIST:SETup:WAVeform <string>, <string>, <string>, ...
SOURce:LIST:SETup:WAVeform?
SOURce:LIST[:STATe] ON | OFF | 1 | 0
SOURce:LIST[:STATe]?
SOURce:LIST:STEP[1]|2|...|4..1000:SETup IMMediate | INTernal | KEY | BUS |
EXTernal2, <time>, NONE | PGSM | EGSM | RGSM | DCS1800 | PCS1900 | TGSM810
| GSM450 | GSM480 | GSM700 | GSM850 | BANDI | BANDII | BANDIII | BANDIV |
BANDV | BANDVI | BANDVII | BANDVIII | BANDIX | BANDX | BANDXI | BANDXII |
BANDXIII | BANDXIV | BANDXIX | USCELL | USPCS | JAPAN | KOREAN | NMT |
IMT2K | UPPER | SECOND | PAMR400 | PAMR800 | IMTEXT | PCS1DOT9G | AWS |
US2DOT5G | PUBLIC | LOWER | NONE | BAND1 | BAND2 | BAND3 | BAND4 | BAND5 |
BAND6 | BAND7 | BAND8 | BAND10 | BAND11 | BAND12 | BAND13 | BAND14 |
BAND17 | BAND18 | BAND19 | BAND20 | BAND21 | BAND24 | BAND25 | BAND26 |
BAND33 | BAND34 | BAND35 | BAND36 | BAND37 | BAND38 | BAND39 | BAND40 |
BAND41 | BAND42 | BAND43 | BANDA | BANDB | BANDC | BANDD | BANDE | BANDF,
DOWN | UP, <freq>, <ampl>, <string>, TIME | COUNt | CONTinuous, <time>, ON
| OFF | 1 | 0, [<int>],
SOURce:LIST:STEP[1]|2|...|4..1000:SETup?
SOURce:LIST:STEP[1]|2|3...1000:SETup:AMPLitude <double>
SOURce:LIST:STEP[1]|2|3...1000:SETup:AMPLitude?
SOURce:LIST:STEP[1]|2|3...1000:SETup:CNFRequency <double>
SOURce:LIST:STEP[1]|2|3...1000:SETup:CNFRequency <double>
SOURce:LIST:STEP[1]|2|3...1000:SETup:CNFRequency?
SOURce:LIST:STEP[1]|2|3...1000:SETup:CNFRequency?
SOURce:LIST:STEP[1]|2|3...1000:SETup:DURation:TCOunt <double>
SOURce:LIST:STEP[1]|2|3...1000:SETup:DURation:TCOunt?
SOURce:LIST:STEP[1]|2|3...1000:SETup:DURation:TYPE TIME | COUNt |
CONTinuous | CABort
SOURce:LIST:STEP[1]|2|3...1000:SETup:DURation:TYPE?
```

```
SOURce:LIST:STEP[1]|2|3...1000:SETup:INPut:TRIGger IMMediate | INTernal |
EXTernal2 | KEY | BUS | EXTernal4
SOURce:LIST:STEP[1]|2|3...1000:SETup:INPut:TRIGger?
SOURce:LIST:STEP[1]|2|3...1000:SETup:OUTPut:TRIGger ON | OFF | 1 | 0
SOURce:LIST:STEP[1]|2|3...1000:SETup:OUTPut:TRIGger
SOURce:LIST:STEP[1]|2|3...1000:SETup:RADio:BAND NONE | PGSM | EGSM | RGSM
| DCS1800 | PCS1900 | TGSM810 | GSM450 | GSM480 | GSM700 | GSM850 | BANDI
| BANDII | BANDIII | BANDIV | BANDV | BANDVI | BANDVII | BANDVIII | BANDIX
| BANDX | BANDXI | BANDXII | BANDXIII | BANDXIV | BANDXIX | USCELL | USPCS
| JAPAN | KOREAN | NMT | IMT2K | UPPER | SECOND | PAMR400 | PAMR800 |
IMTEXT | PCS1DOT9G | AWS | US2DOT5G | PUBLIC | LOWER | NONE | BAND1 |
BAND2 | BAND3 | BAND4 | BAND5 | BAND6 | BAND7 | BAND8 | BAND10 | BAND11 |
BAND12 | BAND13 | BAND14 | BAND17 | BAND18 | BAND19 | BAND20 | BAND21 |
BAND24 | BAND25 | BAND26 | BAND27 | BAND28 | BAND31 | BAND33 | BAND34 |
BAND35 | BAND36 | BAND37 | BAND38 | BAND39 | BAND40 | BAND41 | BAND42 |
BAND43 | BAND44 | BANDA | BANDB | BANDC | BANDD | BANDE | BANDF
SOURce:LIST:STEP[1]|2|3...1000:SETup:RADio:BAND?
SOURce:LIST:STEP[1]|2|3...1000:SETup:RADio:BAND:LINK DOWN | UP
SOURce:LIST:STEP[1]|2|3...1000:SETup:RADio:BAND:LINK?
SOURce:LIST:STEP[1]|2|3...1000:SETup:TRANsition:TIME <time>
SOURce:LIST:STEP[1]|2|3...1000:SETup:TRANsition:TIME?
SOURce:LIST:STEP[1]|2|3...1000:SETup:WAVeform <string>
SOURce:LIST:STEP[1]|2|3...1000:SETup:WAVeform?
SOURce:LIST:TRIGger[:IMMediate]
SOURce:LIST:TRIGger:INITiate[:IMMediate]
SOURce:LIST:TRIGgerout:TYPe BEGinningofstep | DATamarker
SOURce:PM[:DEViation]
SOURce:PM[:DEViation]?
SOURce:PM:INTernal:FREQuency
SOURce:PM:INTernal:FREQuency?
SOURce:PM:STATe
SOURce:PM:STATe?
SOURce:POWer[:LEVel][:IMMediate][:AMPLitude] <ampl>
SOURce:POWer[:LEVel][:IMMediate][:AMPLitude]?
SOURce:POWer[:LEVel][:IMMediate]:OFFSet <rel_ampl>
SOURce:POWer[:LEVel][:IMMediate]:OFFSet?
SOURce:POWer:REFerence <ampl>
SOURce:POWer:REFerence?
SOURce:POWer:REFerence:STATe OFF | ON | 0 | 1
SOURce:POWer:REFerence:STATe?
SOURce:PRESet
SOURce:RADio:ARB:BASeband:FREQuency:OFFSet <freq>
SOURce:RADio:ARB:BASeband:FREQuency:OFFSet?
SOURce:RADio:ARB:CATalog?
SOURce:RADio:ARB:DEFault:DIRectory <string>
SOURce:RADio:ARB:DEFault:DIRectory?
SOURce:RADio:ARB:DELete <string>
SOURce:RADio:ARB:DELete:ALL
SOURce:RADio:ARB:FCATalog?
SOURce:RADio:ARB:HEADer:CLEar
SOURce:RADio:ARB:HEADer:SAVE
SOURce:RADio:ARB:LOAD <string>
```

```
SOURce:RADio:ARB:LOAD:ALL <string>
SOURce:RADio:ARB:MDEStination:ALCHold NONE | M1 | M2 | M3 | M4
SOURce:RADio:ARB:MDEStination:ALCHold?
SOURce:RADio:ARB:MDEStination:PULSe NONE | M1 | M2 | M3 | M4
SOURce:RADio:ARB:MDEStination:PULSe?
SOURce:RADio:ARB:MPLicensed:NAME:LOCKed?
SOURce:RADio:ARB:MPLicensed:UID:LOCKed?
SOURce:RADio:ARB:MPOLarity:MARKer3 POSitive | NEGative
SOURce:RADio:ARB:MPOLarity:MARKer2 POSitive | NEGative
SOURce:RADio:ARB:MPOLarity:MARKer4 POSitive | NEGative
SOURce:RADio:ARB:MPOLarity:MARKer1 POSitive | NEGative
SOURce:RADio:ARB:MPOLarity:MARKer1?
SOURce:RADio:ARB:MPOLarity:MARKer4?
SOURce:RADio:ARB:MPOLarity:MARKer3?
SOURce:RADio:ARB:MPOLarity:MARKer2?
SOURce:RADio:ARB:RETRigger ON | OFF | IMMediate
SOURce:RADio:ARB:RETRigger?
SOURce:RADio:ARB:RSCaling <real>
SOURce:RADio:ARB:RSCaling?
SOURce:RADio:ARB:SCLock:RATE <freq>
SOURce:RADio:ARB:SCLock:RATE?
SOURce:RADio:ARB:SEQuence[:MWAVeform] <filename>, <waveform1>, <reps>,
NONE | M1 | M2 | M3 | M4 | M1M2 | M1M3 | M1M4 | M2M3 | M2M4 | M3M4 |
M1M2M3 | M1M2M4 | M1M3M4 | M2M3M4 | M1M2M3M4 | ALL, {<waveform2>, <reps>,
NONE | M1 | M2 | M3 | M4 | M1M2 | M1M3 | M1M4 | M2M3 | M2M4 | M3M4 |
M1M2M3 | M1M2M4 | M1M3M4 | M2M3M4 | M1M2M3M4 | ALL, }...
SOURce:RADio:ARB:SEQuence[:MWAVeform]? <filename>
SOURce:RADio:ARB[:STATe] ON | OFF | 1 | 0
SOURce:RADio:ARB[:STATe]?
SOURce:RADio:ARB:TRIGger:INITiate
SOURce:RADio:ARB:TRIGger[:SOURce] KEY | BUS | EXTernal2
SOURce:RADio:ARB:TRIGger[:SOURce]?
SOURce:RADio:ARB:TRIGger:TYPE CONTinuous | SINGle | SADVanceGATE
SOURce:RADio:ARB:TRIGger:TYPE?
SOURce:RADio:ARB:TRIGger:TYPE:CONTinuous[:TYPE] FREE | TRIGger | RESet
SOURce:RADio:ARB:TRIGger:TYPE:CONTinuous[:TYPE]?
SOURce:RADio:ARB:TRIGger:TYPE:SADVance[:TYPE] SINGle | CONTinuous
SOURce:RADio:ARB:TRIGger:TYPE:SADVance[:TYPE]?
SOURce:RADio:ARB:WAVeform <string>
SOURce:RADio:ARB:WAVeform?
SOURce:RADio:BAND:LINK DOWN | UP
SOURce:RADio:BAND:LINK?
SOURce:RADio:DEVice BTS | MS
SOURce:RADio:DEVice?
STATus:OPERation:CONDition?
STATus:OPERation:ENABle <integer>
STATus:OPERation:ENABle?
STATus:OPERation[:EVENt]?
STATus:OPERation:NTRansition <integer>
STATus:OPERation:NTRansition?
STATus:OPERation:PTRansition <integer>
STATus:OPERation:PTRansition?
```

```
STATus:PRESet
STATus:QUEStionable:CALibration:CONDition?
STATus:QUEStionable:CALibration:ENABle <integer>
STATus:QUEStionable:CALibration:ENABle?
STATus:QUEStionable:CALibration[:EVENt]?
STATus:QUEStionable:CALibration:EXTended:FAILure:CONDition?
STATus:QUEStionable:CALibration:EXTended:FAILure:ENABle <integer>
STATus:QUEStionable:CALibration:EXTended:FAILure:ENABle?
STATus:QUEStionable:CALibration:EXTended:FAILure[:EVENt]?
STATus:QUEStionable:CALibration:EXTended:FAILure:NTRansition <integer>
STATus:QUEStionable:CALibration:EXTended:FAILure:NTRansition?
STATus:QUEStionable:CALibration:EXTended:FAILure:PTRansition <integer>
STATus:QUEStionable:CALibration:EXTended:FAILure:PTRansition?
STATus:QUEStionable:CALibration:EXTended:NEEDed:CONDition?
STATus:QUEStionable:CALibration:EXTended:NEEDed:ENABle <integer>
STATus:QUEStionable:CALibration:EXTended:NEEDed:ENABle?
STATus:QUEStionable:CALibration:EXTended:NEEDed[:EVENt]?
STATus:QUEStionable:CALibration:EXTended:NEEDed:NTRansition <integer>
STATus:QUEStionable:CALibration:EXTended:NEEDed:NTRansition?
STATus:QUEStionable:CALibration:EXTended:NEEDed:PTRansition <integer>
STATus:QUEStionable:CALibration:EXTended:NEEDed:PTRansition?
STATus:QUEStionable:CALibration:NTRansition <integer>
STATus:QUEStionable:CALibration:NTRansition?
STATus:QUEStionable:CALibration:PTRansition <integer>
STATus:QUEStionable:CALibration:PTRansition?
STATus:QUEStionable:CALibration:SKIPped:CONDition?
STATus:QUEStionable:CALibration:SKIPped:ENABle <integer>
STATus:QUEStionable:CALibration:SKIPped:ENABle?
STATus:QUEStionable:CALibration:SKIPped[:EVENt]?
STATus:QUEStionable:CALibration:SKIPped:NTRansition <integer>
STATus:QUEStionable:CALibration:SKIPped:NTRansition?
STATus:QUEStionable:CALibration:SKIPped:PTRansition <integer>
STATus:QUEStionable:CALibration:SKIPped:PTRansition?
STATus:QUEStionable:CONDition?
STATus:QUEStionable:ENABle <integer>
STATus:QUEStionable:ENABle?
STATus:QUEStionable[:EVENt]?
STATus:QUEStionable:FREQuency:CONDition?
STATus:QUEStionable:FREQuency:ENABle <integer>
STATus:QUEStionable:FREQuency:ENABle?
STATus:QUEStionable:FREQuency[:EVENt]?
STATus:QUEStionable:FREQuency:NTRansition <integer>
STATus:QUEStionable:FREQuency:NTRansition?
STATus:QUEStionable:FREQuency:PTRansition <integer>
STATus:QUEStionable:FREQuency:PTRansition?
STATus:QUEStionable:INTegrity:CONDition?
STATus:QUEStionable:INTegrity:ENABle <integer>
STATus:QUEStionable:INTegrity:ENABle?
STATus:QUEStionable:INTegrity[:EVENt]?
STATus:QUEStionable:INTegrity:NTRansition <integer>
STATus:QUEStionable:INTegrity:NTRansition?
STATus:QUEStionable:INTegrity:PTRansition <integer>
STATus:QUEStionable:INTegrity:PTRansition?
```

```
STATus:QUEStionable:INTegrity:SIGNal:CONDition?
STATus:QUEStionable:INTegrity:SIGNal:ENABle <integer>
STATus:QUEStionable:INTegrity:SIGNal:ENABle?
STATus:QUEStionable:INTegrity:SIGNal[:EVENt]?
STATus:QUEStionable:INTegrity:SIGNal:NTRansition <integer>
STATus:QUEStionable:INTegrity:SIGNal:NTRansition?
STATus:QUEStionable:INTegrity:SIGNal:PTRansition <integer>
STATus:QUEStionable:INTegrity:SIGNal:PTRansition?
STATus:QUEStionable:INTegrity:UNCalibrated:CONDition?
STATus:QUEStionable:INTegrity:UNCalibrated:ENABle
STATus:QUEStionable:INTegrity:UNCalibrated:ENABle?
STATus:QUEStionable:INTegrity:UNCalibrated[:EVENt]?
STATus:QUEStionable:INTegrity:UNCalibrated:NTRansition <integer>
STATus:QUEStionable:INTegrity:UNCalibrated:NTRansition?
STATus:QUEStionable:INTegrity:UNCalibrated:PTRansition <integer>
STATus:QUEStionable:INTegrity:UNCalibrated:PTRansition?
STATus:QUEStionable:NTRansition <integer>
STATus:QUEStionable:NTRansition?
STATus:QUEStionable:POWer:CONDition?
STATus:QUEStionable:POWer:ENABle <integer>
STATus:QUEStionable:POWer:ENABle?
STATus:QUEStionable:POWer[:EVENt]?
STATus:QUEStionable:POWer:NTRansition <integer>
STATus:QUEStionable:POWer:NTRansition?
STATus:QUEStionable:POWer:PTRansition <integer>
STATus:QUEStionable:POWer:PTRansition?>
STATus:QUEStionable:PTRansition <integer>
STATus:QUEStionable:PTRansition?
STATus:QUEStionable:TEMPerature:CONDition?
STATus:QUEStionable:TEMPerature:ENABle <integer>
STATus:QUEStionable:TEMPerature:ENABle?
STATus:QUEStionable:TEMPerature[:EVENt]?
STATus:QUEStionable:TEMPerature:NTRansition <integer>
STATus:QUEStionable:TEMPerature:NTRansition?
STATus:QUEStionable:TEMPerature:PTRansition <integer>
STATus:QUEStionable:TEMPerature:PTRansition?
SYSTem:APPLication:CATalog[:NAME]?
SYSTem:APPLication:CATalog[:NAME]:COUNt?
SYSTem:APPLication:CATalog:OPTion? <model>
SYSTem:APPLication:CATalog:REVision? <model>
SYSTem:APPLication[:CURRent][:NAME]?
SYSTem:APPLication[:CURRent]:OPTion?
SYSTem:APPLication[:CURRent]:REVision?
SYSTem:COMMunicate:LAN:SCPI:HISLip:ENABle OFF | ON | 0 | 1
SYSTem:COMMunicate:LAN:SCPI:HISLip:ENABle?
SYSTem:COMMunicate:LAN:SCPI:SICL:ENABle OFF | ON | 0 | 1
SYSTem:COMMunicate:LAN:SCPI:SICL:ENABle?
SYSTem:COMMunicate:LAN:SCPI:SOCKet:CONTrol?
SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle OFF | ON | 0 | 1
SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle?
SYSTem:COMMunicate:LAN:SCPI:TELNet:ENABle OFF | ON | 0 | 1
SYSTem:COMMunicate:LAN:SCPI:TELNet:ENABle?
SYSTem:CONFigure[:SYSTem]?
```

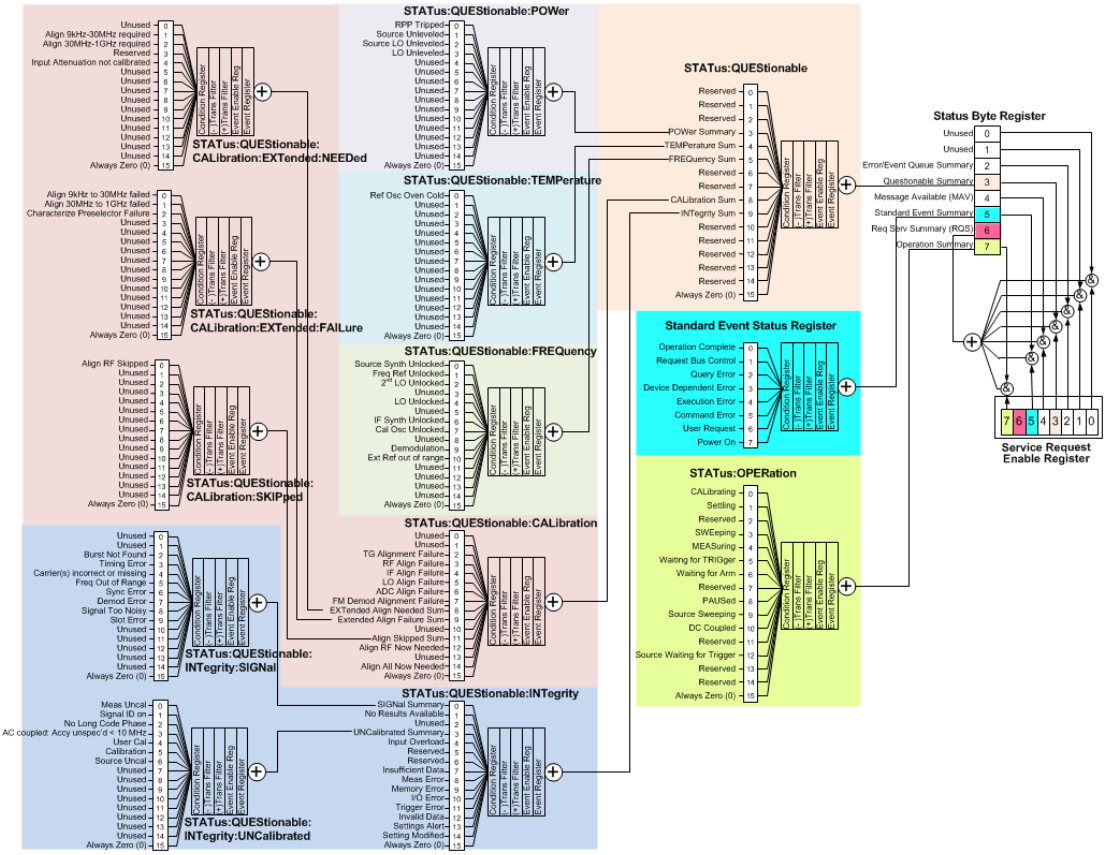
```
SYSTem:CSYStem?
SYSTem:DATE "<year>, <month>, <day>"
SYSTem:DATE?
SYSTem:DEFault [ALL] | ALIGn | INPut | MISC | MODes | PON
SYSTem:ERRor[:NEXT]?
SYSTem:ERRor:OVERload[:STATe] 0 | 1 | OFF | ON
SYSTem:ERRor:PUP?
SYSTem:ERRor:VERBose OFF | ON | 0 | 1
SYSTem:ERRor:VERBose?
SYSTem:HELP:HEADers?
SYSTem:HID?
SYSTem:IDN <string>
SYSTem:IDN?
SYSTem:KLOCk OFF | ON | 0 | 1
SYSTem:KLOCk?
SYSTem:LICense[:FPACk]:WAVeform:ADD <string>
SYSTem:LICense[:FPACk]:WAVeform:CLEar <int>
SYSTem:LICense[:FPACk]:WAVeform:FREE?
SYSTem:LICense[:FPACk]:WAVeform:LOCK <int>
SYSTem:LICense[:FPACk]:WAVeform:NAME? <int>
SYSTem:LICense[:FPACk]:WAVeform:REPLace <int>, <string>
SYSTem:LICense[:FPACk]:WAVeform:STATus? <int>
SYSTem:LICense[:FPACk]:WAVeform:UID? <int>
SYSTem:LICense[:FPACk]:WAVeform:USED?
SYSTem:LKEY <"OptionInfo">, <"LicenseInfo">
SYSTem:LKEY? <"OptionInfo">
SYSTem:LKEY:DELete <"OptionInfo">, <"LicenseInfo">
SYSTem:LKEY:LIST?
SYSTem:LKEY:WAVeform:ADD <string>
SYSTem:LKEY:WAVeform:CLEar <int>
SYSTem:LKEY:WAVeform:FREE?
SYSTem:LKEY:WAVeform:LOCK <int>
SYSTem:LKEY:WAVeform:NAME? <int>
SYSTem:LKEY:WAVeform:REPLace <int>, <string>
SYSTem:LKEY:WAVeform:STATus? <int>
SYSTem:LKEY:WAVeform:UID? <int>
SYSTem:LKEY:WAVeform:USED?
SYSTem:MODule:DEFault "<mnemonic>"
SYSTem:MODule:DEFault?
SYSTem:MODule:ENABle "<mnemonic>", 0 | 1
SYSTem:MODule:ENABle? "<mnemonic>"
SYSTem:MODule:INDex?
SYSTem:MODule:LIST?
SYSTem:MODule:MNEMonic?
SYSTem:MODule:MODel?
SYSTem:MODule:NAME?
SYSTem:MODule:SERial?
SYSTem:OPTions?
SYSTem:PDOWn [NORMal | FORCe]
SYSTem:PON:APPLication:LLISt <stringofINSTrument:SELectnames>
SYSTem:PON:APPLication:LLISt?
SYSTem:PON:APPLication:VMEMory[:AVAilable]?
SYSTem:PON:APPLication:VMEMory:TOTal?
```

```
SYSTem:PON:APPLication:VMEMory:USED?
SYSTem:PON:APPLication:VMEMory:USED:NAME? <INSTrument:SELectname>
SYSTem:PON:MODE SA | BASIC | ADEMOD | NFIGURE | PNOISE | CDMA2K | TDSCDMA
| VSA | VSA89601 | WCDMA | WIMAXOFDMA
SYSTem:PON:MODE?
SYSTem:PON:TIME?
SYSTem:PON:TYPE PRESet
SYSTem:PON:TYPE MODE | USER | LAST
SYSTem:PON:TYPE?
SYSTem:PRESet
SYSTem:PRESet:USER
SYSTem:PRESet:USER:ALL
SYSTem:PRESet:USER:SAVE
SYSTem:PRINt:THEMe TDColor | TDMonochrome | FCOLor | FMONochrome
SYSTem:PRINt:THEMe?
SYSTem:PUP:PROCess
SYSTem:SECurity:USB:WPRotect[:ENABle] ON | OFF | 0 | 1
SYSTem:SECurity:USB:WPRotect[:ENABle]?
SYSTem:SHOW OFF | ERRor | SYSTem | HARDware | LXI | HWSTatistics |
ALIGnment | SOFTware | CAPPlication
SYSTem:SHOW?
SYSTem:TEST:WCTS:[ALL]
SYSTem:TEST:WCTS:FEC
SYSTem:TEST:WCTS:FEC:RESult?
SYSTem:TEST:WCTS:SHOW:RESult FEC
SYSTem:TIME "<hour>, <minute>, <second>"
SYSTem:TIME?
SYSTem:VERSion?
TRIGger[:SEQuence]:EXTernal1:DELay <time>
TRIGger[:SEQuence]:EXTernal1:DELay?
TRIGger[:SEQuence]:EXTernal1:DELay:STATe OFF | ON | 0 | 1
TRIGger[:SEQuence]:EXTernal1:DELay:STATe?
TRIGger[:SEQuence]:EXTernal1:HOLDoff <time>
TRIGger[:SEQuence]:EXTernal1:HOLDoff?
TRIGger[:SEQuence]:EXTernal1:HOLDoff:STATe OFF | ON | 0 | 1
TRIGger[:SEQuence]:EXTernal1:HOLDoff:STATe?
TRIGger[:SEQuence]:EXTernal1:HOLDoff:TYPE BELow | ABOVe
TRIGger[:SEQuence]:EXTernal1:HOLDoff:TYPE?
TRIGger[:SEQuence]:EXTernal1:LEVel <voltage>
TRIGger[:SEQuence]:EXTernal1:LEVel?
TRIGger[:SEQuence]:EXTernal1:SLOPe POSitive | NEGative
TRIGger[:SEQuence]:EXTernal1:SLOPe?
TRIGger[:SEQuence]:RLINe OFF | ON | 0 | 1
TRIGger[:SEQuence]:RLINe?
TRIGger[:SEQuence]:VIDeo:DELay <time>
TRIGger[:SEQuence]:VIDeo:DELay?
TRIGger[:SEQuence]:VIDeo:DELay:STATe OFF | ON | 0 | 1
TRIGger[:SEQuence]:VIDeo:DELay:STATe?
TRIGger[:SEQuence]:VIDeo:HOLDoff <time>
TRIGger[:SEQuence]:VIDeo:HOLDoff?
TRIGger[:SEQuence]:VIDeo:HOLDoff:STATe OFF | ON | 0 | 1
TRIGger[:SEQuence]:VIDeo:HOLDoff:STATe?
TRIGger[:SEQuence]:VIDeo:HOLDoff:TYPE BELow | ABOVe
```

```
TRIGger[:SEQuence]:VIDeo:HOLDoff:TYPE?
TRIGger[:SEQuence]:VIDeo:LEVel <voltage>
TRIGger[:SEQuence]:VIDeo:LEVel?
TRIGger[:SEQuence]:VIDeo:SLOPe POSitive | NEGative
TRIGger[:SEQuence]:VIDeo:SLOPe?
```

STATus Subsystem

The following diagram shows the entire Status Register Subsystem implementation of the X Series instruments.



Detailed Description

The STATus subsystem remote commands set and query the status hardware registers. This system of registers monitors various events and conditions in the instrument. Software written to control the instrument may need to monitor some of these events and conditions.

NOTE All status register commands are sequential. Most commands can be started immediately and will overlap with any existing commands that are already running. This is not true of status commands. All the commands in the spectrum analyzer are assumed to be overlapped unless a command description specifically says that it is sequential.

What Are Status Registers

The status system contains multiple registers that are arranged in a hierarchical order. The lower-level status registers propagate their data to the higher-level registers in the data structures by means of summary bits. The status byte register is at the top of the hierarchy and contains general status information for the instrument's events and conditions. All other individual registers are used to determine the specific events or conditions. For a diagram of the registers and their interconnections, see above.

The operation and questionable status registers are sets of registers that monitor the overall instrument condition. They are accessed with the STATus:OPERation and STATus:QUEStionable commands in the STATus command subsystem. Each register set is made up of five registers:

- Condition Register—It reports the real-time state of the signals monitored by this register set. There is no latching or buffering for a condition register.
- Positive Transition Register—This filter register controls which signals will set a bit in the event register when the signal makes a low to high transition (when the condition bit changes from 0 to 1).
- Negative Transition Register—This filter register controls which signals will set a bit in the event register when the signal makes a high to low transition (when the condition bit changes from 1 to 0).
- Event Register—It latches any signal state changes, in the way specified by the filter registers. Bits in the event register are never cleared by signal state changes. Event registers are cleared when read. They are also cleared by *CLS and by presetting the instrument.
- Event Enable Register—It controls which of the bits, being set in the event register, will be summarized as a single output for the register set. Summary bits are then used by the next higher register.

The STATus:QUEStionable registers report abnormal operating conditions. The status register hierarchy is:

1. The summary outputs from the six STATus:QUEStionable:<keyword> detail registers are inputs to the STATus:QUEStionable register.
2. The summary output from the STATus:QUEStionable register is an input to the Status Byte Register. See the overall system in Figure at the beginning of this section.

The STATus:OPERation register set has no summarized inputs. The inputs to the STATus:OPERation:CONDition register indicate the real time state of the instrument. The STATus:OPERation:EVENt register summary output is an input to the Status Byte Register.

What Are Status Register SCPI Commands

Most monitoring of the instrument conditions is done at the highest level using the IEEE common commands indicated below. Complete command descriptions are available in the IEEE commands section at the beginning of the language reference. Individual status registers can be set and queried using the commands in the STATus subsystem of the language reference.

- *CLS (clear status) clears the status byte by emptying the error queue and clearing all the event registers.
- *ESE, *ESE? (event status enable) sets and queries the bits in the enable register part of the standard event status register.
- *ESR? (event status register) queries and clears the event register part of the standard event status register.
- *OPC, *OPC? (operation complete) sets the standard event status register to monitor the completion of all commands. The query stops any new commands from being processed until the current processing is complete, then returns a ‘1’.
- *PSC, *PSC? (power-on state clear) sets the power-on state so that it clears the service request enable register and the event status enable register at power on.
- *SRE, *SRE? (service request enable) sets and queries the value of the service request enable register.

- *STB? (status byte) queries the value of the status byte register without erasing its contents.

How to Use the Status Registers

A program often needs to be able to detect and manage error conditions or changes in instrument status. There are two methods you can use to programmatically access the information in status registers:

- The polling method
- The service request (SRQ) method

In the polling method, the instrument has a passive role. It only tells the controller that conditions have changed when the controller asks the right question. In the SRQ method, the instrument takes a more active role. It tells the controller when there has been a condition change without the controller asking. Either method allows you to monitor one or more conditions.

The polling method works well if you do not need to know about changes the moment they occur. The SRQ method should be used if you must know immediately when a condition changes. To detect a change using the polling method, the program must repeatedly read the registers.

Use the SRQ method when:

- you need time-critical notification of changes
- you are monitoring more than one device which supports SRQs
- you need to have the controller do something else while waiting
- you can't afford the performance penalty inherent to polling

Use polling when:

- your programming language/development environment does not support SRQ interrupts
- you want to write a simple, single-purpose program and don't want the added complexity of setting up an SRQ handler
- To monitor a condition:

  a. Determine which register contains the bit that reports the condition.

  b. Send the unique SCPI query that reads that register.

  c. Examine the bit to see if the condition has changed.

You can monitor conditions in different ways.

- Check the current instrument hardware and firmware status.

Do this by querying the condition registers which continuously monitor status. These registers represent the current state of the instrument. Bits in a condition register are updated in real time. When the condition monitored by a particular bit becomes true, the bit is set to 1. When the condition becomes false, the bit is reset to 0.

- Monitor a particular condition (bit).

You can enable a particular bit(s), using the event enable register. The instrument will then monitor that particular condition(s). If the bit becomes true (0 to 1 transition) in the event register, it will stay set until the

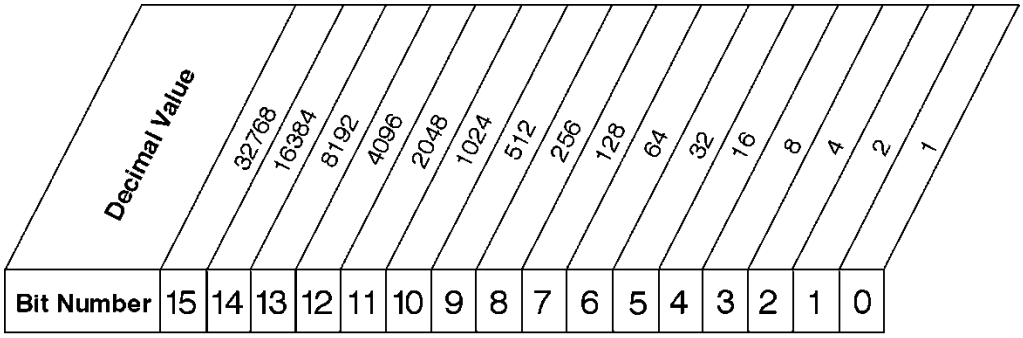
event register is cleared. Querying the event register allows you to detect that this condition occurred even if the condition no longer exists. The event register can only be cleared by querying it or sending the *CLS command.

- Monitor a particular type of change in a condition (bit).
  - –The transition registers are preset to register if the condition goes from 0 to 1 (false to true, or a positive transition).
  - –This can be changed so the selected condition is detected if the bit goes from 1 to 0 (true to false, or a negative transition).
  - –It can also be set for both types of transitions occurring.
  - –Or it can be set for neither transition. If both transition registers are set to 0 for a particular bit position, that bit will not be set in the event register for either type of change.

Using a Status Register

Each bit in a register is represented by a numerical value based on its location. See figure below. This number is sent with the command to enable a particular bit. If you want to enable more than one bit, you would send the sum of all the bits that you want to monitor.

Figure: Status Register Bit Values



Bit 15 is not used to report status.

Example 1:

1. To enable bit 0 and bit 6 of standard event status register, you would send the command *ESE 65 because 1 + 64 = 65.
2. The results of a query are evaluated in a similar way. If the *STB? command returns a decimal value of 140, (140 = 128 + 8 + 4) then bit 7 is true, bit 3 is true and bit 2 is true.

Example 2:

1. Suppose you want to know if an Auto-trigger Timeout occurs, but you only cared about that specific condition. So you would want to know what was happening with bit 10 in the Status Questionable Integrity register, and not about any other bits.

2. It's usually a good idea to start by clearing all the status registers with *CLS.
3. Sending the STAT:QUES:INT:ENAB 1024 command lets you monitor only bit 10 events, instead of the default monitoring all the bits in the register. The register default is for positive transition events (0 to 1 transition). That is, when an auto-trigger timeout occurs. If instead, you wanted to know when the Auto-trigger timeout condition is cleared, then you would set the STAT:QUES:INT:PTR 0 and the STAT:QUES:INT:NTR 32767.
4. So now the only output from the Status Questionable Integrity register will come from a bit 10 positive transition. That output goes to the Integrity Sum bit 9 of the Status Questionable register.
5. You can do a similar thing with this register to only look at bit 9 using, STAT:QUES:ENAB 512.
6. The Status Questionable register output goes to the "Status Questionable Summary" bit 3 of the Status Byte Register. The output from this register can be enabled using the *SRE 8 command.
7. Finally, you would use the serial polling functionality available for the particular bus/software that you are using to monitor the Status Byte Register. (You could also use *STB? to poll the Status Byte Register.)

Using the Service Request (SRQ) Method

Your language, bus, and programming environment must be able to support SRQ interrupts. (For example, BASIC used with VXI–11.3 (GPIB over LAN). When you monitor a condition with the SRQ method, you must:

1. Determine which bit monitors the condition.
2. Determine how that bit reports to the request service (RQS) bit of the status byte.
3. Send SCPI commands to enable the bit that monitors the condition and to enable the summary bits that report the condition to the RQS bit.
4. Enable the controller to respond to service requests.

When the condition changes, the instrument sets its RQS bit. The controller is informed of the change as soon as it occurs. As a result, the time the controller would otherwise have used to monitor the condition can be used to perform other tasks. Your program determines how the controller responds to the SRQ.

Generating a Service Request

To use the SRQ method, you must understand how service requests are generated. Bit 6 of the status byte register is the request service (RQS) bit. The *SRE command is used to configure the RQS bit to report changes in instrument status. When such a change occurs, the RQS bit is set. It is cleared when the status byte register is queried using *SRE? (with a serial poll.) It can be queried without erasing the contents with *STB?.

When a register set causes a summary bit in the status byte to change from 0 to 1, the instrument can initiate the service request (SRQ) process. However, the process is only initiated if both of the following conditions are true:

- The corresponding bit of the service request enable register is also set to 1.
- The instrument does not have a service request pending. (A service request is considered to be pending between the time the instrument's SRQ process is initiated and the time the controller reads the status byte register.)

The SRQ process sets the SRQ true. It also sets the status byte's request service (RQS) bit to 1. Both actions are necessary to inform the controller that the instrument requires service. Setting the SRQ line only informs the controller that some device on the bus requires service. Setting the RQS bit allows the controller to determine which instrument requires service.

If your program enables the controller to detect and respond to service requests, it should instruct the controller to perform a serial poll when the SRQ is set true. Each device on the bus returns the contents of its status byte register in response to this poll. The device who's RQS bit is set to 1 is the device that requested service.

When you read the instrument's status byte register with a serial poll, the RQS bit is reset to 0. Other bits in the register are not affected.

If the status register is configured to SRQ on end-of-measurement and the measurement is in continuous mode, then restarting a measurement (INIT command) can cause the measuring bit to pulse low. This causes an SRQ when you have not actually reached the "end-of-measurement" condition. To avoid this:

1. Set INITiate:CONTinuous off.

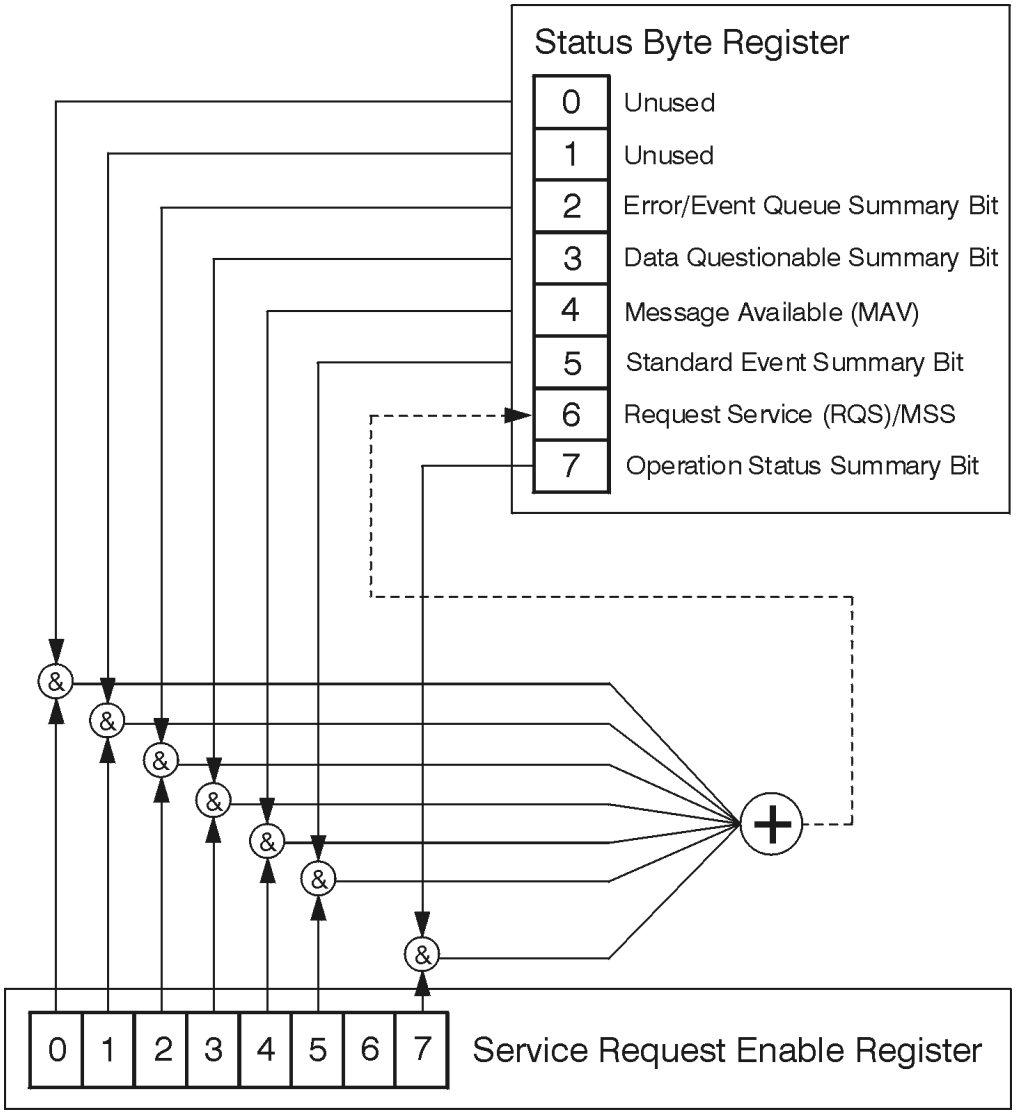
2. Set/enable the status registers.

3. Restart the measurement (send INIT).

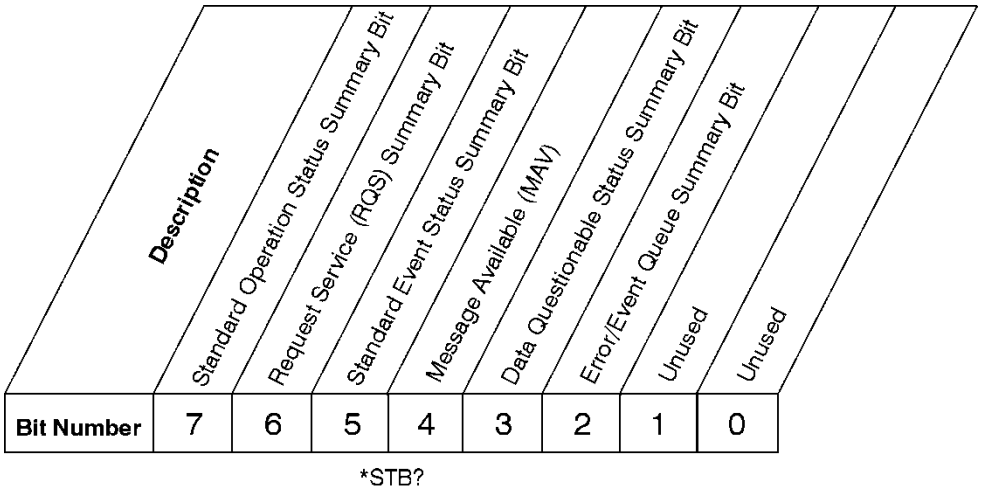
Status Register System

The hardware status registers are combined to form the instrument status system. Specific status bits are assigned to monitor various aspects of the instrument operation and status. See the diagram of the status system above for information about the bit assignments and status register interconnections.

The Status Byte Register



The RQS bit is read and reset by a serial poll. The same bit position (MSS) is read, non-destructively by the *STB? command. If you serial poll bit 6 it is read as RQS, but if you send *STB it reads bit 6 as MSS. For more information refer to IEEE 488.2 standards, section 11.



Bit	Description
0, 1	These bits are always set to 0.
2	A 1 in this bit position indicates that the SCPI error queue is not empty which means that it contains at least one error message.
3	A 1 in this bit position indicates that the data questionable summary bit has been set. The data questionable event register can then be read to determine the specific condition that caused this bit to be set.
4	A 1 in this bit position indicates that the instrument has data ready in the output queue. There are no lower status groups that provide input to this bit.
5	A 1 in this bit position indicates that the standard event summary bit has been set. The standard event status register can then be read to determine the specific event that caused this bit to be set.
6	A 1 in this bit position indicates that the instrument has at least one reason to report a status change. This bit is also called the master summary status bit (MSS).
7	A 1 in this bit position indicates that the standard operation summary bit has been set. The standard operation event register can then be read to determine the specific condition that caused this bit to be set.

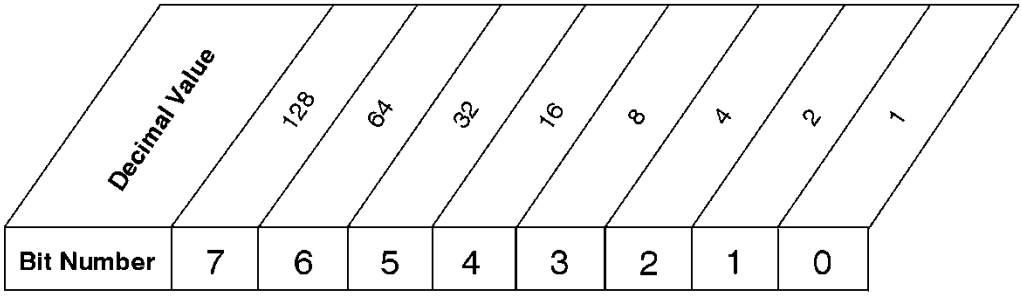
To query the status byte register, send the command *STB? The response will be the decimal sum of the bits which are set to 1. For example, if bit number 7 and bit number 3 are set to 1, the decimal sum of the 2 bits is 128 plus 8. So the decimal value 136 is returned. The *STB command does not clear the status register.

In addition to the status byte register, the status byte group also contains the service request enable register. This register lets you choose which bits in the status byte register will trigger a service request.

Send the *SRE <integer> command where <integer> is the sum of the decimal values of the bits you want to enable plus the decimal value of bit 6. For example, assume that you want to enable bit 7 so that whenever the standard operation status register summary bit is set to 1 it will trigger a service request. Send the command *SRE 192 (because 192 = 128 + 64). You must always add 64 (the numeric value of RQS

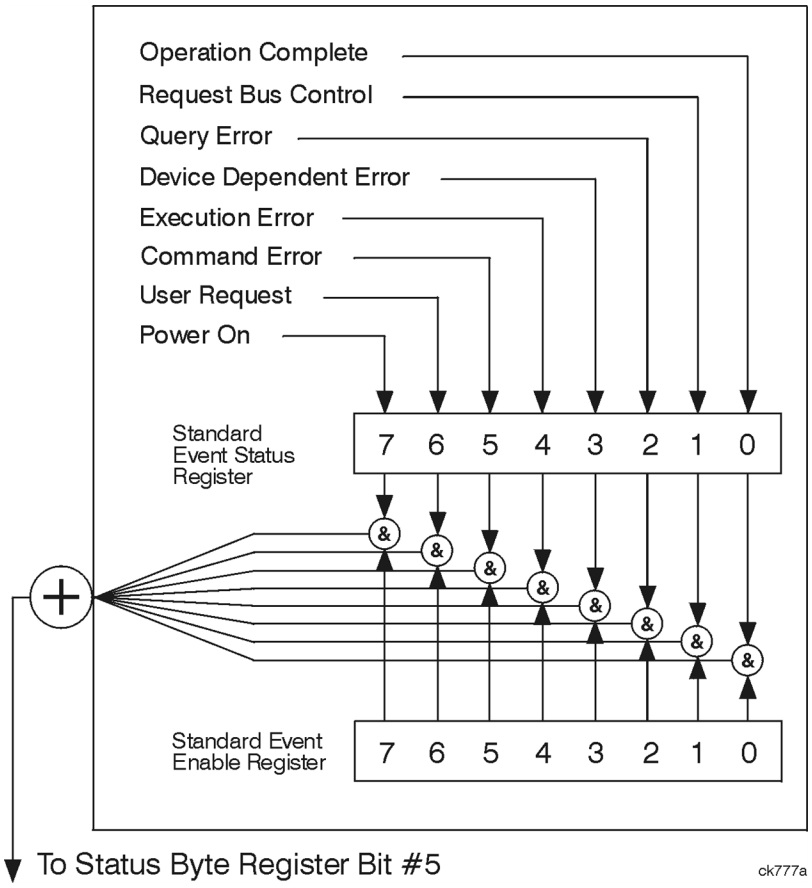
bit 6) to your numeric sum when you enable any bits for a service request. The command *SRE? returns the decimal value of the sum of the bits previously enabled with the *SRE <integer> command.

The service request enable register presets to zeros (0).



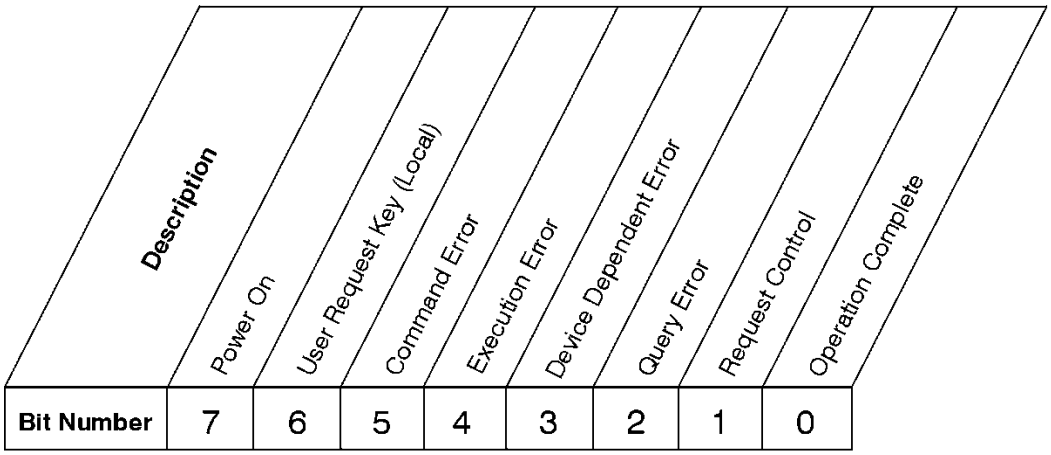
Service Request Enable Register ck726a

Standard Event Status Register



ck777a

The standard event status register contains the following bits:



*ESR?

Standard Event Status Register

ck727a

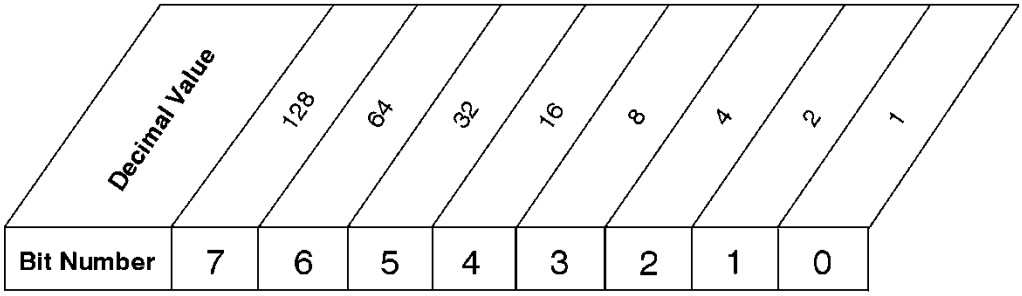
Bit	Description
0	A 1 in this bit position indicates that all pending operations were completed following execution of the *OPC command.
1	This bit is for GPIB handshaking to request control. Currently it is set to 0 because there are no implementations where the spectrum analyzer controls another instrument.
2	A 1 in this bit position indicates that a query error has occurred. Query errors have SCPI error numbers from –499 to –400.
3	A 1 in this bit position indicates that a device dependent error has occurred. Device dependent errors have SCPI error numbers from –399 to –300 and 1 to 32767.
4	A 1 in this bit position indicates that an execution error has occurred. Execution errors have SCPI error numbers from –299 to –200.
5	A 1 in this bit position indicates that a command error has occurred. Command errors have SCPI error numbers from –199 to –100.
6	A 1 in this bit position indicates that the LOCAL key has been pressed. This is true even if the instrument is in local lockout mode.
7	A 1 in this bit position indicates that the instrument has been turned off and then on.

The standard event status register is used to determine the specific event that set bit 5 in the status byte register. To query the standard event status register, send the command *ESR?. The response will be the decimal sum of the bits which are enabled (set to 1). For example, if bit number 7 and bit number 3 are enabled, the decimal sum of the 2 bits is 128 plus 8. So the decimal value 136 is returned.

In addition to the standard event status register, the standard event status group also contains a standard event status enable register. This register lets you choose which bits in the standard event status register will set the summary bit (bit 5 of the status byte register) to 1. Send the *ESE <integer> command where <integer> is the sum of the decimal values of the bits you want to enable. For example, to enable bit 7 and bit 6 so that whenever either of those bits is set to 1, the standard event status summary bit of the status

byte register will be set to 1, send the command *ESE 192 (128 + 64). The command *ESE? returns the decimal value of the sum of the bits previously enabled with the *ESE <integer> command.

The standard event status enable register presets to zeros (0).



Standard Event Status Enable Register

Operation and Questionable Status Registers

The operation and questionable status registers are registers that monitor the overall instrument condition. They are accessed with the STATus:OPERation and STATus:QUEStionable commands in the STATus command subsystem. See the figure at the beginning of this chapter.

Operation Status Register

The operation status register monitors the current instrument measurement state. It checks to see if the instrument is calibrating, sweeping, or waiting for a trigger. For more information see the *OPC? command located in the IEEE Common Commands section.

Bit	Condition	Operation
0	Calibrating	The instrument is busy executing its Align Now process
3	Sweeping	The instrument is busy taking a sweep.
4	Measuring	The instrument is busy making a measurement. Measurements often require multiple sweeps. They are initiated by keys under the MEASURE key or with the MEASure group of commands. The bit is valid for most X-Series Modes.
5	Waiting for trigger	The instrument is waiting for the trigger conditions to be met, then it will trigger a sweep or measurement.

Questionable Status Register

The questionable status register monitors the instrument's condition to see if anything questionable has happened to it. It is looking for anything that might cause an error or a bad measurement like a hardware problem, an out of calibration situation, or a unusual signal. All the bits are summary bits from lower-level event registers.

Bit	Condition	Operation

3	Power summary	The instrument hardware has detected a power unleveled condition.
4	Temperature summary	The instrument is still warming up.
5	Frequency summary	The instrument hardware has detected an unlocked condition or a problem with the external frequency reference.
8	Calibration summary	The instrument has detected a hardware problem while doing the automatic internal alignment process.
9	Integrity summary	The instrument has detected a questionable measurement condition such as: bad timing, bad signal/data, timeout problem, signal overload, or “meas uncal”.

STATus Subsystem Command Descriptions

The STATus subsystem controls the SCPI-defined instrument status reporting structures. Each status register has a set of five commands used for querying or masking that particular register.

Numeric values for bit patterns can be entered using decimal or hexadecimal representations. (i.e. 0 to 32767 is equivalent to #H0 to #H7FFF. It is also equal to all ones, 111111111111111) See the SCPI Basics information about using bit patterns for variable parameters.

Operation Register

"Operation Condition Query" on page 79

"Operation Enable" on page 80

"Operation Event Query" on page 80

"Operation Negative Transition" on page 80

"Operation Positive Transition" on page 81

Operation Condition Query

This query returns the decimal value of the sum of the bits in the Status Operation Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	`:STATus:OPERation:CONDition?`
Example	STAT:OPER:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Operation Enable

This command determines which bits in the Operation Event register, will set the Operation Status Summary bit (bit 7) in the Status Byte Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

NOTE The preset condition is to have all bits in this enable register set to 0. To have any Operation Events reported to the Status Byte Register, one or more bits need to be set to 1.

Mode	All
Remote Command	`:STATus:OPERation:ENABle <integer>` `:STATus:OPERation:ENABle?`
Example	STAT:OPER:ENAB 1 Sets the register so that Align Now operation will be reported to the Status Byte Register.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Operation Event Query

This query returns the decimal value of the sum of the bits in the Operation Event register.

NOTE The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	`:STATus:OPERation[:EVENt]?`
Example	STAT:OPER?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Operation Negative Transition

This command determines which bits in the Operation Condition register will set the corresponding bit in the Operation Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	`:STATus:OPERation:NTRansition <integer>` `:STATus:OPERation:NTRansition?`
Example	STAT:OPER:NTR 1 Align Now operation complete will be reported to the Status Byte Register.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Operation Positive Transition

This command determines which bits in the Operation Condition register will set the corresponding bit in the Operation Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	`:STATus:OPERation:PTRansition <integer>` `:STATus:OPERation:PTRansition?`
Example	STAT:OPER:PTR 1 Align Now operation beginning will be reported to the Status Byte Register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Preset the Status Byte

Sets bits in most of the enable and transition registers to their default state. It presets all the Transition Filters, Enable Registers, and the Error/Event Queue Enable. It has no effect on Event Registers, Error/Event QUEue, IEEE 488.2 ESE, and SRE Registers as described in IEEE Standard 488.2–1992, IEEE Standard Codes, Formats, Protocols, and Common Commands for Use with ANSI/IEEE Std 488.1–1987. New York, NY, 1992.

Remote Command	`:STATus:PRESet`
Example	STAT:PRES
Initial S/W Revision	Prior to A.02.00

Questionable Register

"Questionable Condition " on page 82

"Questionable Enable " on page 82

"Questionable Event Query " on page 83

"Questionable Negative Transition " on page 83

"Questionable Positive Transition" on page 83

Questionable Condition

This query returns the decimal value of the sum of the bits in the Questionable Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	`:STATus:QUEStionable:CONDition?`
Example	STAT:QUES:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Enable

This command determines which bits in the Questionable Event register will set the Questionable Status Summary bit (bit3) in the Status Byte Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

NOTE The preset condition is all bits in this enable register set to 0. To have any Questionable Events reported to the Status Byte Register, one or more bits need to be set to 1. The Status Byte Event Register should be queried after each measurement to check the Questionable Status Summary (bit 3). If it is equal to 1, a condition during the test may have made the test results invalid. If it is equal to 0, this indicates that no hardware problem or measurement problem was detected by the analyzer.

Mode	All
Remote Command	`:STATus:QUEStionable:ENABle <integer>` `:STATus:QUEStionable:ENABle?`
Example	STAT:OPER:PTR 1 Align Now operation beginning will be reported to the Status Byte Register.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Event Query

This query returns the decimal value of the sum of the bits in the Questionable Event register.

NOTE The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	`:STATus:QUEStionable[:EVENt]?`
Example	STAT:QUES?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Negative Transition

This command determines which bits in the Questionable Condition register will set the corresponding bit in the Questionable Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:NTRansition <integer>` `:STATus:QUEStionable:NTRansition?`
Example	STAT:QUES:NTR 16 Temperature summary 'questionable cleared' will be reported to the Status Byte Register.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Positive Transition

This command determines which bits in the Questionable Condition register will set the corresponding bit in the Questionable Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All

Remote Command	`:STATus:QUEStionable:PTRansition <integer>` `:STATus:QUEStionable:PTRansition?`
Example	STAT:QUES:PTR 16 Temperature summary 'questionable asserted' will be reported to the Status Byte Register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Register

"Questionable Calibration Condition " on page 84

"Questionable Calibration Enable " on page 84

"Questionable Calibration Event Query " on page 85

"Questionable Calibration Negative Transition " on page 85

"Questionable Calibration Positive Transition " on page 86

Questionable Calibration Condition

This query returns the decimal value of the sum of the bits in the Questionable Calibration Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	`:STATus:QUEStionable:CALibration:CONDition?`
Example	STAT:QUES:CAL:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Enable

This command determines which bits in the Questionable Calibration Condition Register will set bits in the Questionable Calibration Event register, which also sets the Calibration Summary bit (bit 8) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:CALibration:ENABle <integer> :STATus:QUEStionable:CALibration:ENABle?
Example	STAT:QUES:CAL:ENAB 16384 Can be used to query if an alignment is needed, if you have turned off the automatic alignment process.
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Event Query

This query returns the decimal value of the sum of the bits in the Questionable Calibration Event register.

NOTE The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:QUEStionable:CALibration[:EVENt]?
Example	STAT:QUES:CAL?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Negative Transition

This command determines which bits in the Questionable Calibration Condition register will set the corresponding bit in the Questionable Calibration Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:CALibration:NTRansition <integer> :STATus:QUEStionable:CALibration:NTRansition?
Example	STAT:QUES:CAL:NTR 16384 Alignment is not required.
Preset	0
Min	0

Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Positive Transition

This command determines which bits in the Questionable Calibration Condition register will set the corresponding bit in the Questionable Calibration Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:CALibration:PTRansition <integer>` `:STATus:QUEStionable:CALibration:PTRansition?`
Example	STAT:QUES:CAL:PTR 16384 Alignment is required.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Skipped Register

"Questionable Calibration Skipped Condition " on page 86

"Questionable Calibration Skipped Enable " on page 87

"Questionable Calibration Skipped Event Query " on page 87

"Questionable Calibration Skipped Negative Transition " on page 88

"Questionable Calibration Skipped Positive Transition " on page 88

Questionable Calibration Skipped Condition

This query returns the decimal value of the sum of the bits in the Questionable Calibration Skipped Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	`:STATus:QUEStionable:CALibration:SKIPped:CONDition?`

Example	STAT:QUES:CAL:SKIP:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Skipped Enable

This command determines which bits in the Questionable Calibration Skipped Condition Register will set bits in the Questionable Calibration Skipped Event register, which also sets bit 11 of the Questionable Calibration Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:CALibration:SKIPped:ENABle <integer>` `:STATus:QUEStionable:CALibration:SKIPped:ENABle?`
Example	STAT:QUES:CAL:SKIP:ENAB 1 Can be used to query if an EMI alignment skipped condition is detected
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Skipped Event Query

This query returns the decimal value of the sum of the bits in the Questionable Calibration Event register.

NOTE The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	`:STATus:QUEStionable:CALibration:SKIPped[:EVENt]?`
Example	STAT:QUES:CAL:SKIP?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Skipped Negative Transition

This command determines which bits in the Questionable Calibration Skipped Condition register will set the corresponding bit in the Questionable Calibration Skipped Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:CALibration:SKIPped:NTRansition <integer>` `:STATus:QUEStionable:CALibration:SKIPped:NTRansition?`
Example	STAT:QUES:CAL:SKIP:NTR 1 Align RF skipped is not required.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Skipped Positive Transition

This command determines which bits in the Questionable Calibration Skipped Condition register will set the corresponding bit in the Questionable Calibration Skipped Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:CALibration:SKIPped:PTRansition <integer>` `:STATus:QUEStionable:CALibration:SKIPped:PTRansition?`
Example	STAT:QUES:CAL:SKIP:PTR 1 Align RF skipped is required.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Failure Register

"Questionable Calibration Extended Failure Condition " on page 89

"Questionable Calibration Extended Failure Enable " on page 89

"Questionable Calibration Extended Failure Event Query " on page 89

"Questionable Calibration Extended Failure Negative Transition " on page 90

"Questionable Calibration Extended Failure Positive Transition " on page 90

Questionable Calibration Extended Failure Condition

This query returns the decimal value of the sum of the bits in the Questionable Calibration Extended Failure Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	`:STATus:QUEStionable:CALibration:EXTended:FAILure:CONDition?`
Example	STAT:QUES:CAL:EXT:FAIL:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Failure Enable

This command determines which bits in the Questionable Calibration Extended Failure Condition Register will set bits in the Questionable Calibration Extended Failure Event register, which also sets bit 9 of the Questionable Calibration Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:CALibration:EXTended:FAILure:ENABle <integer>` `:STATus:QUEStionable:CALibration:EXTended:FAILure:ENABle?`
Example	STAT:QUES:CAL:EXT:FAIL:ENAB 1 Can be used to query if an EMI conducted alignment is needed.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Failure Event Query

This query returns the decimal value of the sum of the bits in the Questionable Calibration Extended Failure Event register.

NOTE The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	`:STATus:QUEStionable:CALibration:EXTended:FAILure[:EVENt]?`
Example	STAT:QUES:CAL:EXT:FAIL?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Failure Negative Transition

This command determines which bits in the Questionable Calibration Extended Failure Condition register will set the corresponding bit in the Questionable Calibration Extended Failure Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:CALibration:EXTended:FAILure:NTRansition <integer>` `:STATus:QUEStionable:CALibration:EXTended:FAILure:NTRansition?`
Example	STAT:QUES:CAL:EXT:FAIL:NTR 1 EMI conducted align failure is not required.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Failure Positive Transition

This command determines which bits in the Questionable Calibration Extended Failure Condition register will set the corresponding bit in the Questionable Calibration Extended Failure Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:CALibration:EXTended:FAILure:PTRansition <integer>` `:STATus:QUEStionable:CALibration:EXTended:FAILure:PTRansition?`
Example	STAT:QUES:CAL:EXT:FAIL:PTR 1 EMI conducted align failure is required.
Preset	32767
Min	0
Max	32767

Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Needed Register

"Questionable Calibration Extended Needed Condition " on page 91

"Questionable Calibration Extended Needed Enable " on page 91

"Questionable Calibration Extended Needed Event Query " on page 92

"Questionable Calibration Extended Needed Negative Transition " on page 92

"Questionable Calibration Extended Needed Positive Transition " on page 93

Questionable Calibration Extended Needed Condition

This query returns the decimal value of the sum of the bits in the Questionable Calibration Extended Needed Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	`:STATus:QUEStionable:CALibration:EXTended:NEEDed:CONDition?`
Example	STAT:QUES:CAL:EXT:NEED:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Needed Enable

This command determines which bits in the Questionable Calibration Extended Needed Condition Register will set bits in the Questionable Calibration Extended Needed Event register, which also sets bit 14 of the Questionable Calibration Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:CALibration:EXTended:NEEDed:ENABle <integer>` `:STATus:QUEStionable:CALibration:EXTended:NEEDed:ENABle?`
Example	STAT:QUES:CAL:EXT:NEED:ENAB 2 Can be used to query if an EMI conducted alignment is needed.
Preset	32767
Min	0

Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Needed Event Query

This query returns the decimal value of the sum of the bits in the Questionable Calibration Extended Needed Event register.

NOTE The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	`:STATus:QUEStionable:CALibration:EXTended:NEEDed[:EVENt]?`
Example	STAT:QUES:CAL:EXT:NEED?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Needed Negative Transition

This command determines which bits in the Questionable Calibration Extended Needed Condition register will set the corresponding bit in the Questionable Calibration Extended Needed Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:CALibration:EXTended:NEEDed:NTRansition <integer>` `:STATus:QUEStionable:CALibration:EXTended:NEEDed:NTRansition?`
Example	STAT:QUES:CAL:EXT:NEED:NTR 2 Align EMI conducted is not required.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Needed Positive Transition

This command determines which bits in the Questionable Calibration Extended Needed Condition register will set the corresponding bit in the Questionable Calibration Extended Needed Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:CALibration:EXTended:NEEDed:PTRansition <integer>` `:STATus:QUEStionable:CALibration:EXTended:NEEDed:PTRansition?`
Example	STAT:QUES:CAL:EXT:NEED:PTR 2 Align EMI conducted is required.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Frequency Register

"Questionable Frequency Condition " on page 93

"Questionable Frequency Enable " on page 94

"Questionable Frequency Event Query " on page 94

"Questionable Frequency Negative Transition " on page 94

"Questionable Frequency Positive Transition " on page 95

Questionable Frequency Condition

This query returns the decimal value of the sum of the bits in the Questionable Frequency Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	`:STATus:QUEStionable:FREQuency:CONDition?`
Example	STAT:QUES:FREQ:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Frequency Enable

This command determines which bits in the Questionable Frequency Condition Register will set bits in the Questionable Frequency Event register, which also sets the Frequency Summary bit (bit 5) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:FREQuency:ENABle <integer>` `:STATus:QUEStionable:FREQuency:ENABle?`
Example	STAT:QUES:FREQ:ENAB 2 Frequency Reference Unlocked will be reported to the Frequency Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Frequency Event Query

This query returns the decimal value of the sum of the bits in the Questionable Frequency Event register.

NOTE The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	`:STATus:QUEStionable:FREQuency[:EVENt]?`
Example	STAT:QUES:FREQ?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Frequency Negative Transition

This command determines which bits in the Questionable Frequency Condition register will set the corresponding bit in the Questionable Frequency Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All

Remote Command	`:STATus:QUEStionable:FREQuency:NTRansition <integer>` `:STATus:QUEStionable:FREQuency:NTRansition?`
Example	STAT:QUES:FREQ:NTR 2 Frequency Reference 'regained lock' will be reported to the Frequency Summary of the Status Questionable register.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Frequency Positive Transition

This command determines which bits in the Questionable Frequency Condition register will set the corresponding bit in the Questionable Frequency Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:FREQuency:PTRansition <integer>` `:STATus:QUEStionable:FREQuency:PTRansition?`
Example	STAT:QUES:FREQ:PTR 2 Frequency Reference 'became unlocked' will be reported to the Frequency Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Register

"Questionable Integrity Condition " on page 95

"Questionable Integrity Enable " on page 96

"Questionable Integrity Event Query " on page 96

"Questionable Integrity Negative Transition " on page 97

"Questionable Integrity Positive Transition " on page 97

Questionable Integrity Condition

This query returns the decimal value of the sum of the bits in the Questionable Integrity Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	`:STATus:QUEStionable:INTegrity:CONDition?`
Example	STAT:QUES:INT:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Enable

This command determines which bits in the Questionable Integrity Condition Register will set bits in the Questionable Integrity Event register, which also sets the Integrity Summary bit (bit 9) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:INTegrity:ENABle <integer>` `:STATus:QUEStionable:INTegrity:ENABle?`
Example	STAT:QUES:INT:ENAB 8 Measurement Uncalibrated Summary will be reported to the Integrity Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Event Query

This query returns the decimal value of the sum of the bits in the Questionable Integrity Event register.

NOTE The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	`:STATus:QUEStionable:INTegrity[:EVENt]?`
Example	STAT:QUES:INT?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Negative Transition

This command determines which bits in the Questionable Integrity Condition register will set the corresponding bit in the Questionable Integrity Event register when the condition register bit has a negative transition (1 to 0)

The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:INTegrity:NTRansition <integer>` `:STATus:QUEStionable:INTegrity:NTRansition?`
Example	STAT:QUES:INT:NTR 8 Measurement 'regained calibration' Summary will be reported to the Integrity Summary of the Status Questionable register.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Positive Transition

This command determines which bits in the Questionable Integrity Condition register will set the corresponding bit in the Questionable Integrity Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:INTegrity:PTRansition <integer>` `:STATus:QUEStionable:INTegrity:PTRansition?`
Example	STAT:QUES:INT:PTR 8 Measurement 'became uncalibrated' Summary will be reported to the Integrity Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Signal Register

"Questionable Integrity Signal Condition" on page 98

"Questionable Integrity Signal Enable" on page 98

"Questionable Integrity Signal Event Query" on page 99

"Questionable Integrity Signal Negative Transition" on page 99

"Questionable Integrity Signal Positive Transition" on page 99

Questionable Integrity Signal Condition

This query returns the decimal value of the sum of the bits in the Questionable Integrity Signal Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	`:STATus:QUEStionable:INTegrity:SIGNal:CONDition?`
Example	STAT:QUES:INT:SIGN:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Signal Enable

This command determines which bits in the Questionable Integrity Signal Condition Register will set bits in the Questionable Integrity Signal Event register, which also sets the Integrity Summary bit (bit 9) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:INTegrity:SIGNal:ENABle <integer>` `:STATus:QUEStionable:INTegrity:SIGNal:ENABle?`
Example	STAT:QUES:INT:SIGN:ENAB 4 Burst Not Found will be reported to the Integrity Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Signal Event Query

This query returns the decimal value of the sum of the bits in the Questionable Integrity Signal Event register.

NOTE The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	`:STATus:QUEStionable:INTegrity:SIGNal[:EVENt]?`
Example	STAT:QUES:INT:SIGN?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Signal Negative Transition

This command determines which bits in the Questionable Integrity Signal Condition register will set the corresponding bit in the Questionable Integrity Signal Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:INTegrity:SIGNal:NTRansition <integer>` `:STATus:QUEStionable:INTegrity:SIGNal:NTRansition?`
Example	STAT:QUES:INT:SIGN:NTR 4 Burst found will be reported to the Integrity Summary of the Status Questionable register.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Signal Positive Transition

This command determines which bits in the Questionable Integrity Signal Condition register will set the corresponding bit in the Questionable Integrity Signal Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:INTegrity:SIGNal:PTRansition <integer> :STATus:QUEStionable:INTegrity:SIGNal:PTRansition?
Example	STAT:QUES:INT:SIGN:PTR 4 Burst not found will be reported to the Integrity Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Uncalibrated Register

"Questionable Integrity Uncalibrated Condition " on page 100

"Questionable Integrity Uncalibrated Enable " on page 100

"Questionable Integrity Uncalibrated Event Query " on page 101

"Questionable Integrity Uncalibrated Negative Transition " on page 101

"Questionable Integrity Uncalibrated Positive Transition " on page 102

Questionable Integrity Uncalibrated Condition

This query returns the decimal value of the sum of the bits in the Questionable Integrity Uncalibrated Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUEStionable:INTegrity:UNCalibrated:CONDition?
Example	STAT:QUES:INT:UNC:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Uncalibrated Enable

This command determines which bits in the Questionable Integrity Uncalibrated Condition Register will set bits in the Questionable Integrity Uncalibrated Event register, which also sets the Data Uncalibrated Summary bit (bit 3) in the Questionable Integrity Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:INTegrity:UNCalibrated:ENABle` `:STATus:QUEStionable:INTegrity:UNCalibrated:ENABle?`
Example	STAT:QUES:INT:UNC:ENAB 1 Oversweep (Meas Uncal) will be reported to the Integrity Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Uncalibrated Event Query

This query returns the decimal value of the sum of the bits in the Questionable Integrity Uncalibrated Event register.

NOTE The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	`:STATus:QUEStionable:INTegrity:UNCalibrated[:EVENt]?`
Example	STAT:QUES:INT:UNC?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Uncalibrated Negative Transition

This command determines which bits in the Questionable Integrity Uncalibrated Condition register will set the corresponding bit in the Questionable Integrity Uncalibrated Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:INTegrity:UNCalibrated:NTRansition <integer>` `:STATus:QUEStionable:INTegrity:UNCalibrated:NTRansition?`
Example	STAT:QUES:INT:UNC:NTR 1 Oversweep cleared will be reported to the Integrity Summary of the Status Questionable register.

Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Uncalibrated Positive Transition

This command determines which bits in the Questionable Integrity Uncalibrated Condition register will set the corresponding bit in the Questionable Integrity Uncalibrated Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:INTegrity:UNCalibrated:PTRansition <integer>` `:STATus:QUEStionable:INTegrity:UNCalibrated:PTRansition?`
Example	STAT:QUES:INT:UNC:PTR 1 Oversweep (Meas Uncal) occurred will be reported to the Integrity Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Power Register

"Questionable Power Condition " on page 102

"Questionable Power Enable " on page 103

"Questionable Power Event Query " on page 103

"Questionable Power Negative Transition " on page 104

"Questionable Power Positive Transition " on page 104

Questionable Power Condition

This query returns the decimal value of the sum of the bits in the Questionable Power Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	`:STATus:QUEStionable:POWer:CONDition?`
Example	STAT:QUES:POW:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Power Enable

This command determines which bits in the Questionable Power Condition Register will set bits in the Questionable Power Event register, which also sets the Power Summary bit (bit 3) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:POWer:ENABle <integer>` `:STATus:QUEStionable:POWer:ENABle?`
Example	STAT:QUES:POW:ENAB 32 50 MHz Input Pwr too High for Cal will be reported to the Power Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Power Event Query

This query returns the decimal value of the sum of the bits in the Questionable Power Event register.

NOTE The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	`:STATus:QUEStionable:POWer[:EVENt]?`
Example	STAT:QUES:POW?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Power Negative Transition

This command determines which bits in the Questionable Power Condition register will set the corresponding bit in the Questionable Power Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:POWer:NTRansition <integer>` `:STATus:QUEStionable:POWer:NTRansition?`
Example	STAT:QUES:POW:NTR 32 50 MHz Input Power became OK for Cal will be reported to the Power Summary of the Status Questionable register.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Power Positive Transition

This command determines which bits in the Questionable Power Condition register will set the corresponding bit in the Questionable Power Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:POWer:PTRansition <integer>` `:STATus:QUEStionable:POWer:PTRansition?>`
Example	STAT:QUES:POW:PTR 32 50 MHz Input Power became too high for Cal will be reported to the Power Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Temperature Register

"Questionable Temperature Condition" on page 105

"Questionable Temperature Enable" on page 105

"Questionable Temperature Event Query" on page 105

"Questionable Temperature Negative Transition" on page 106

"Questionable Temperature Positive Transition" on page 106

Questionable Temperature Condition

This query returns the decimal value of the sum of the bits in the Questionable Temperature Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	`:STATus:QUEStionable:TEMPerature:CONDition?`
Example	STAT:QUES:TEMP:COND?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Temperature Enable

This command determines which bits in the Questionable Temperature Condition Register will set bits in the Questionable Temperature Event register, which also sets the Temperature Summary bit (bit 4) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:TEMPerature:ENABle <integer>` `:STATus:QUEStionable:TEMPerature:ENABle?`
Example	STAT:QUES:TEMP:ENAB 1 Reference Oscillator Oven Cold will be reported to the Temperature Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Temperature Event Query

This query returns the decimal value of the sum of the bits in the Questionable Temperature Event register.

NOTE The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared

Mode	All
Remote Command	`:STATus:QUEStionable:TEMPerature[:EVENt]?`
Example	STAT:QUES:TEMP?
Preset	0
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Temperature Negative Transition

This command determines which bits in the Questionable Temperature Condition register will set the corresponding bit in the Questionable Temperature Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:TEMPerature:NTRansition <integer>` `:STATus:QUEStionable:TEMPerature:NTRansition?`
Example	STAT:QUES:TEMP:NTR 1 Reference Oscillator Oven not cold will be reported to the Temperature Summary of the Status Questionable register.
Preset	0
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Questionable Temperature Positive Transition

This command determines which bits in the Questionable Temperature Condition register will set the corresponding bit in the Questionable Temperature Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	`:STATus:QUEStionable:TEMPerature:PTRansition <integer>` `:STATus:QUEStionable:TEMPerature:PTRansition?`
Example	STAT:QUES:TEMP:PTR 1 Reference Oscillator Oven became cold will be reported to the

	Temperature Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
Status Bits/OPC dependencies	Sequential command
Initial S/W Revision	Prior to A.02.00

Common Commands

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"Standard Event Status Register Query " on page 111

"Identification Query " on page 112

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"Service Request Enable " on page 115

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All (Daily use)

Immediately executes an alignment of all subsystems which includes both the source and the analyzer in the TRX module. The “All” alignment is sufficient to maintain specified performance, provided that (1) the TRX’s internal temperature has not drifted more than +/–5 degree C since the previous alignment, and (2) no more than 8 hours have elapsed since the previous “All” alignment., and (3) no more than 1 week has elapsed since these three alignments have all been run: IF, RF, and Source, and (4) a 45 minute warm-up period between power-up of the TRX and invoking the “All” alignment. The instrument stops any measurement currently underway, performs the alignment, then restarts the measurement from the beginning (similar to pressing the Restart key).

If an interfering user signal is present at the RF Input, the alignment is performed on all subsystems except the RF. After completion, the Error Condition message “Align skipped: 50 MHz interference” or “Align skipped: 4.8 GHz interference” is generated. In addition the Error Condition message “Align Now, RF required” is generated, and bits 11 and 12 are set in the Status Questionable Calibration register.

The query form of the remote commands (:CALibration[:ALL]? or *CAL?) invokes the alignment of all subsystems and returns a success or failure value. An interfering user signal is not grounds for failure; if the alignment was able to succeed on all portions but unable to align the RF because of an interfering signal, the resultant will be the success value.

Successful completion of Align Now, All will clear the “Align Now, All required” Error Condition, and clear bit 14 in the Status Questionable Calibration register. It will also begin the elapsed time counter for Last Align Now, All Time, and capture the Last Align Now, All Temperature.

If the Align RF subsystem succeeded in aligning (no interfering signal present), the elapsed time counter begins for Last Align Now, RF Time, and the temperature is captured for the Last Align Now, RF Temperature. In addition the Error Conditions “Align skipped: 50 MHz interference” and “Align skipped: 4.8 GHz interference” are cleared, the Error Condition “Align Now, RF required” is cleared, and bits 11 and 12 are cleared in the Status Questionable Calibration register

Align Now, All can be interrupted by pressing the Cancel (ESC) front-panel key or remotely with Device Clear followed by the :ABORt SCPI command. When this occurs the Error Condition message “Align Now, All required” is generated, and bit 14 is set in the Status Questionable Condition register. This is because new alignment data may be employed for an individual subsystem, but not a cohesive set of data for all subsystems.

In many cases, you might find it more convenient to change alignments to Normal, instead of executing Align Now, All. When the Auto Align process transitions to Normal, the analyzer will immediately start to update only the alignments that have expired, thus efficiently restoring the alignment process.

NOTE In EXM, Source ARB play will be turned off and the source states will not be restored after Align Now, All.

Key Path	System, Alignments, Align Now
Mode	All
Remote Command	`:CALibration[:ALL]` `:CALibration[:ALL]?`
Example	:CAL
Notes	:CALibration[:ALL]? returns 0 if successful :CALibration[:ALL]? returns 1 if failed :CALibration[:ALL]? is the same as *CAL? While Align Now, All is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. Successful completion will clear bit 14 in the Status Questionable Calibration register. An interfering user signal is not grounds for failure of Align Now, All. However, bits 11 and 12 are set in the Status Questionable Calibration register to indicate Align Now, RF is required. An interfering user supplied signal will result in the instrument requiring an Align Now, RF with the interfering signal removed.
Couplings	Initializes the time for the Last Align Now, All Time. Records the temperature for the Last Align Now, All Temperature. If Align RF component succeeded, initializes the time for the Last Align Now, RF Time. If Align RF component succeeded, records the temperature for the Last Align Now, RF Temperature.
Status Bits/OPC dependencies	Bits 11, 12, or 14 may be set in the Status Questionable Calibration register.
Initial S/W Revision	Prior to A.02.00

Mode	All
Remote Command	`*CAL?`
Example	*CAL?
Notes	*CAL? returns 0 if successful *CAL? returns 1 if failed :CALibration[:ALL]? is the same as *CAL? See additional remarks described with :CALibration[:ALL]? Everything about :CALibration[:ALL]? is synonymous with *CAL? including all conditions, status register bits, and couplings
Initial S/W Revision	Prior to A.02.00

Mode	All
Remote Command	`:CALibration[:ALL]:NPENding`
Example	CAL:NPEN
Notes	:CALibration[:ALL]:NPENding is the same as :CALibration[:ALL] including all conditions, status register bits, except this scpi command does not BLOCK the scpi session, so the user should use status register bits to query if the calibration is successfully completed or not. Typical usage is: 1) :CALibration:ALL:NPENding (Start a calibration) 2) :STATus:OPERation:CONDition? (Check if the calibration is completed or not, If bit 0 is set, then the system is doing calibration, the user should repeat this scpi query until the bit is cleared) 3):STATus:QUEStionable:CALibration:CONDition? (Check if if there are any errors/failures in previous calibration procedure
Initial S/W Revision	X.14.20

Clear Status

Clears the status byte register. It does this by emptying the error queue and clearing all bits in all of the event registers. The status byte register summarizes the states of the other registers. It is also responsible for generating service requests.

Key Path	No equivalent key. Related key System, Show Errors, Clear Error Queue
Remote Command	`*CLS`
Example	*CLS Clears the error queue and the Status Byte Register.
Notes	For related commands, see the SYSTem:ERRor[:NEXT]? command. See also the STATus:PRESet command and all commands in the STATus subsystem.
Status Bits/OPC dependencies	Resets all bits in all event registers to 0, which resets all the status byte register bits to 0 also.
Backwards Compatibility Notes	In general the status bits used in the X-Series status system will be backwards compatible with ESA and PSA. However, note that all conditions will generate events that go into the event log, and some

	will also generate status bits.
Initial S/W Revision	Prior to A.02.00

Standard Event Status Enable

Selects the desired bits from the standard event status enable register. This register monitors I/O errors and synchronization conditions such as operation complete, request control, query error, device dependent error, status execution error, command error, and power on. The selected bits are OR'd to become a summary bit (bit 5) in the byte register which can be queried.

The query returns the state of the standard event status enable register.

Key Path	No equivalent key. Related key System, Show Errors, Clear Error Queue
Remote Command	`*ESE <integer>` `*ESE?`
Example	*ESE 36 Enables the Standard Event Status Register to monitor query and command errors (bits 2 and 5). *ESE? Returns a 36 indicating that the query and command status bits are enabled.
Notes	For related commands, see the STATus subsystem and SYSTem:ERRor[:NEXT]? commands.
Preset	255
State Saved	Not saved in state.
Min	0
Max	255
Status Bits/OPC dependencies	Event Enable Register of the Standard Event Status Register.
Initial S/W Revision	Prior to A.02.00

Standard Event Status Register Query

Queries and clears the standard event status event register. (This is a destructive read.) The value returned is a hexadecimal number that reflects the current state (0/1) of all the bits in the register.

Remote Command	`*ESR?`
Example	*ESR? Returns a 1 if there is either a query or command error, otherwise it returns a zero.
Notes	For related commands, see the STATus subsystem commands.
Preset	0
Min	0
Max	255
Status Bits/OPC dependencies	Standard Event Status Register (bits 0 – 7).
Initial S/W Revision	Prior to A.02.00

Identification Query

Returns a string of instrument identification information. The string will contain the model number, serial number, and firmware revision.

The response is organized into four fields separated by commas. The field definitions are as follows:

- Manufacturer
- Model
- Serial number
- Firmware version

Key Path	No equivalent key. See related key System, Show System.
Remote Command	`*IDN?`
Example	*IDN? Returns instrument identification information, such as: Keysight Technologies, E6640A, US01020004, E.14.50
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	x.14.50

Operation Complete

The *OPC command sets bit 0 in the standard event status register (SER) to “1” when pending operations have finished, that is when all overlapped commands are complete. It does not hold off subsequent operations. You can determine when the overlapped commands have completed either by polling the OPC bit in SER, or by setting up the status system such that a service request (SRQ) is asserted when the OPC bit is set.

The *OPC? query returns a “1” after all the current overlapped commands are complete. So it holds off subsequent commands until the "1” is returned, then the program continues. This query can be used to synchronize events of other instruments on the external bus.

Remote Command	`*OPC` `*OPC?`
Example	INIT:CONT 0 Selects single sweeping. INIT:IMM Initiates a sweep. *OPC? Holds off any further commands until the sweep is complete.
Status Bits/OPC dependencies	Not global to all remote ports or front panel. *OPC only considers operation that was initiated on the same port as the *OPC command was issued from. *OPC is an overlapped command, but *OPC? is sequential.
Backwards Compatibility Notes	1. The ESA/PSA/VSA products do not meet all the requirements for the *OPC command specified by IEEE 488.2. This is corrected for X-Series. This will sometimes cause behavior that is not backward compatible, but it will work as customers expect.

	2. Commands such as, *OPC/*OPC?/*WAI/*RST used to be global. They considered front panel operation in conjunction with the GPIB functionality. Now they are evaluated on a per channel basis. That is, the various rear panel remote ports and the front panel i/o are all considered separately. Only the functionality initiated on the port where the *OPC was sent, is considered for its operation. 3. *OPC used to hold off until the operation bits were cleared. Now it holds off until all overlapping commands are completed. Also, earlier instruments did not wait for completion of all processes, only the ones identified here (in the STATus:OPERation register): Calibrating: monitored by PSA, ESA, VSA (E4406A) Sweeping: monitored by PSA, ESA, VSA (E4406A) Waiting for Trigger: monitored by PSA, ESA, VSA (E4406A) Measuring: monitored by PSA and ESA (but not in all Modes). Paused: monitored by VSA (E4406A). Printing: monitored by VSA (E4406A). Mass memory busy: monitored by VSA (E4406A).
Initial S/W Revision	Prior to A.02.00

Query Instrument Options

Returns a string of all the installed instrument options. It is a comma separated list with quotes, such as: “503,P03,PFR”.

To be IEEE compliant, this command should return an arbitrary ascii variable that would not begin and end with quotes. But the quotes are needed to be backward compatible with previous SA products and software. So, the actual implementation will use arbitrary ascii. But quotes will be sent as the first and last ascii characters that are sent with the comma-separated option list.

Remote Command	`*OPT?`
Initial S/W Revision	Prior to A.02.00

Recall Instrument State

This command recalls the instrument state from the specified instrument memory register.

- If the state being loaded has a newer firmware revision than the revision of the instrument, no state is recalled and an error is reported
- If the state being loaded has an equal firmware revision than the revision of the instrument, the state will be loaded.
- If the state being loaded has an older firmware revision than the revision of the instrument, the instrument will only load the parts of the state that apply to the older revision.

Remote Command	`*RCL <register #>`
Example	*RCL 7 Recalls the instrument state that is currently stored in register 7.

Notes	Registers 0 through 6 are accessible from the front panel in menu keys for Recall Registers.
Min	0
Max	127
Status Bits/OPC dependencies	The command is sequential.
Initial S/W Revision	Prior to A.02.00

*RST (Remote Command Only)

*RST is equivalent to :SYST:PRES;:INIT:CONT OFF, which is a Mode Preset in the Single measurement state. This remote command is preferred over Mode Preset remote command - :SYST:PRES, as optimal remote programming occurs with the instrument in the single measurement state.

Remote Command	`*RST`
Example	*RST
Notes	Sequential Clears all pending OPC bits and the Status Byte is set to 0.
Couplings	A *RST will cause the currently running measurement to be aborted and cause the default measurement to be active. *RST gets the mode to a consistent state with all of the default couplings set.
Backwards Compatibility Notes	In legacy analyzers *RST did not set the analyzer to Single, but in the X-Series it does, for compliance with the IEEE 488.2 specification. In the X-Series, *RST does not do a *CLS (clear the status bits and the error queue). In legacy analyzers, *RST used to do the equivalent of SYSTem:PRESet, *CLS and INITiate:CONTinuous OFF. But to be 488.2 compliant, *RST in the X-Series does not do a *CLS.
Initial S/W Revision	Prior to A.02.00

Save Instrument State

This command saves the current instrument state and mode to the specified instrument memory register.

Remote Command	`*SAV <register #>`
Example	*SAV 9 Saves the instrument state in register 9.
Notes	Registers 0 through 6 are accessible from the front panel in menu keys for Save Registers.
Min	0
Max	127
Status Bits/OPC dependencies	The command is sequential.
Initial S/W Revision	Prior to A.02.00

Service Request Enable

This command enables the desired bits of the service request enable register.

The query returns the value of the register, indicating which bits are currently enabled.

Remote Command	`*SRE <integer>` `*SRE?`
Example	*SRE 22 Enables bits 1, 2, and 4 in the service request enable register.
Notes	For related commands, see the STATus subsystem and SYSTem:ERRor[:NEXT]? commands.
Preset	0
Min	0
Max	255
Status Bits/OPC dependencies	Service Request Enable Register (all bits, 0 – 7).
Initial S/W Revision	Prior to A.02.00

Status Byte Query

Returns the value of the status byte register without erasing its contents.

Remote Command	`*STB?`
Example	*STB? Returns a decimal value for the bits in the status byte register. For example, if a 16 is returned, it indicates that bit 5 is set and one of the conditions monitored in the standard event status register is set.
Notes	See related command *CLS.
Status Bits/OPC dependencies	Status Byte Register (all bits, 0 – 7).
Initial S/W Revision	Prior to A.02.00

Trigger

This command triggers the instrument. Use the :TRIGger[:SEQuence]:SOURce command to select the trigger source.

Key Path	No equivalent key. See related keys Single and Restart.
Remote Command	`*TRG`
Example	*TRG Triggers the instrument to take a sweep or start a measurement, depending on the current instrument settings.
Notes	See related command :INITiate:IMMediate.
Initial S/W Revision	Prior to A.02.00

Self Test Query

This query performs the internal self-test routines and returns a number indicating the success of the testing. A zero is returned if the test is successful, 1 if it fails.

Remote Command	`*TST?`
Example	*TST? Runs the self-test routines and returns 0=passed, 1=some part failed.
Initial S/W Revision	Prior to A.02.00

Wait-to-Continue

This command causes the instrument to wait until all overlapped commands are completed before executing any additional commands. There is no query form for the command.

Remote Command	`*WAI`
Example	INIT:CONT OFF; INIT;*WAI Sets the instrument to single sweep. Starts a sweep and waits for its completion.
Status Bits/OPC dependencies	Not global to all remote ports or front panel. *OPC only considers operation that was initiated on the same port as the *OPC command was issued from.
Initial S/W Revision	Prior to A.02.00

4 Input/Output Functions

Input/Output

The Input/Output features are common across multiple Modes and Measurements. These common features are described in this section. See the Measurement description for information on features that are unique.

The Input/Output key accesses the keys that control the Input/Output parameters of the instrument. In general, these are functions associated with external connections to the analyzer, either to the inputs or the outputs. Since these connections tend to be fairly stable within a given setup, in general, the input/output settings do not change when you Preset the analyzer.

Other functions related to the input/output connections, but which tend to change on a measurement by measurement basis, can be found under the Trigger and AMPTD Y Scale keys. In addition, some of the digital I/O bus configurations can be found under the System key.

NOTE The functions in the Input/Output menu are "global" (common) to all Modes (applications). But individual Input/Output functions only appear in a Mode if they apply to that Mode. Functions that apply to a Mode but not to all measurements in the Mode may be grayed-out in some measurements.

"Input/Output variables - Preset behavior" on page 119

The Input Port selection is the first menu under the Input/Output key:

Key Path	Front-panel key
Remote Command	`[:SENSe]:FEED RF|AIQ|EMIXer` `[:SENSe]:FEED?`
Example	:FEED RF :FEED?
Couplings	The [:SENSe]:FEED RF command turns the calibrator OFF
Preset	This setting is unaffected by a Preset or power cycle. It survives a Mode Preset and mode changes. It is set to RF on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved	Saved in instrument state
Backwards Compatibility SCPI	`[:SENSe]:FEED AREFerence` In the PSA the calibrator was one of the inputs and selected using the AREF parameter to the same :FEED command that switched the inputs. In the X-Series it is controlled in a separate menu and overrides the input selection. For code compatibility the [:SENSe]:FEED AREFerence command is provided, and is aliased to [SENSe]:FEED:AREF REF50, which causes the input to be switched to the 50 MHz calibrator. The [:SENSe]:FEED RF command switches the input back to the RF port and turns the calibrator OFF, thus providing full compatibility with the PSA calibrator function. Note that after sending this, the query [:SENSe]:FEED? will NOT return “AREF” but instead the currently selected input.

Backwards Compatibility SCPI	`[:SENSe]:FEED IQ|IONLy|QONLy`
	`[:SENSe]:FEED?`
	The parameters IQ | IONLy | QONLy are supported for backwards compatibility with the E44406A.
	[:SENSe]:FEED IQ aliases to [:SENSe]:FEED: IQ:TYPE IQ
	[:SENSe]:FEED IONLy aliases to [:SENSe]:FEED:IQ:TYPE IONLy

	[:SENSe]:FEED QONLy aliases to [:SENSe]:FEED:IQ:TYPE QONLy The query [:SENSe]:FEED? will always returns AIQ whatever the type of legacy parameters IQ | IONLy | QONLy has been used.
Backwards Compatibility Notes	Most of the settings in the X-Series Input/Output system, including External Gain, Amplitude Corrections settings and data, etc., are shared by all modes and are not changed by a mode switch. Furthermore, most variables in the Input/Output system key are not affected by Mode Preset. Both of these behaviors represent a departure from legacy behavior. In the X-Series. Input/Output settings are reset by using the "Restore Input/Output Defaults" function. They can also be reset to their default values through the System->Restore System Defaults-> In/Out Config key or through the System ->Restore System Defaults -> All key (and corresponding SCPI). While this matches most use cases better, it does create some code compatibility issues. For example, Amplitude Corrections are no longer turned off by a Mode Preset, but instead by using the "Restore Input/Output Defaults" key/SCPI. Although Input/Output settings are not part of each Mode's State, they are saved in the Save State files, so that all of the instrument settings can be recalled with Recall State, as in legacy instruments.
Initial S/W Revision	Prior to A.02.00

Remote Command	`:INPut:MIXer EXTernal|INTernal` `:INPut:MIXer?`
Example	INP:MIX INT INP:MIX?
Notes	In legacy analyzers you choose between the Internal mixer or an External Mixer. In the X-Series, the External Mixer is one of the choices for the Input and is selected using the FEED command (:SENSe:FEED EXTMixer). For compatibility, the INPut:MIXer EXTernal|INTernal legacy command is mapped as follows: 1. When INPut:MIXer EXTernal is received, SENSe:FEED EMIXer is executed. 2. When INPut:MIXer INTernal is received, SENSe:FEED RF is executed. 3. When INPut:MIXer? is received, the response will be INT if any input other than the external mixer is selected and EXT if the external mixer is selected
Preset	INT
Backwards Compatibility Notes	PSA supports the following SCPI Command : :INPut:MIXer:TYPE PRESelected|UNPReselect :INPut:MIXer:TYPE? PXA does not support the :INPut:MIXer:TYPE command.
Initial S/W Revision	A.08.01

Input/Output variables - Preset behavior

Virtually all the input/output settings are NOT a part of mode preset. They can be set to their default value

by one of the three ways:

- by using the Restore Input/Output Defaults key on the first page of the input/output menu,
- by using the System->Restore System Defaults->Input/Output Settings or,
- by using the System -> Restore System Defaults->All. Also, they survive a Preset and a Power cycle.

A very few of the Input/Output settings do respond to a Mode Preset; for example, if the Calibrator is on it turns off on a Preset, and if DC coupling is in effect it switches to AC on a Preset. These exceptions are made in the interest of reliability and usability, which overrides the need for absolute consistency. Exceptions are noted in the SCPI table for the excepted functions.

RF Input

Selects the front-panel RF input port to be the analyzer signal input. If RF is already selected, pressing this key accesses the RF input setup functions.

Key Path	Input/Output
Example	[:SENSe]:FEED RF
Couplings	The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Input to automatically switch to the RF Input. If the RF Calibrator is on, it is turned off. Subsequently disconnecting the USB Preamp from USB does not change the Input selection nor restore the previous selection.
Readback	The RF input port, RF coupling, and current input impedance settings appear on this key as: "XX, YY, ZZ" where XX is RF, RF2, RFIO1, RFIO2, depending on what input is selected (only appears on analyzers with multiple RF inputs) YY is AC or DC ZZ is 50Ω or 75Ω
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

Input Z Correction

Sets the input impedance for unit conversions. This affects the results when the y-axis unit is voltage or current units (dBmV, dBµV, dBµA, V, A), but not when it is power units (dBm, W). The impedance you select is for computational purposes only, since the actual impedance is set by internal hardware to 50 ohms. Setting the computational input impedance to 75 ohms is useful when using a 75 ohm to 50 ohm adapter to measure a 75 ohm device on an analyzer with a 50 ohm input impedance.

There are a variety ways to make 50 to 75 ohm transitions, such as impedance transformers or minimum loss pads. The choice of the solution that is best for your measurement situation requires balancing the amount of loss that you can tolerate with the amount of measurement frequency range that you need. If you are using one of these pads/adaptors with the Input Z Corr function, you might also want to use the Ext Gain key. This function is used to set a correction value to compensate for the gain (loss) through your pad. This correction factor is applied to the displayed measurement values.

Key Path	Input/Output, RF Input
Remote Command	`[:SENSe]:CORRection:IMPedance[:INPut][:MAGNitude] 50|75` `[:SENSe]:CORRection:IMPedance[:INPut][:MAGNitude]?`
Example	CORR:IMP 75 sets the input impedance correction to 75 ohms. CORR:IMP?
Preset	This is unaffected by a Preset but is set to 50 ohms on a "Restore Input/Output Defaults" or "Restore System Defaults->All" Some instruments/options may have 75 ohms available.
State Saved	Saved in instrument state
Readback	50 Ω or 75 Ω. Current setting reads back to the RF key.
Initial S/W Revision	Prior to A.02.00

RF Input Port

Specifies the RF input port used. The RF Input Port key only appears on units with multiple inputs, and lets you switch between the two inputs.

Switching from the RF input port to one of the RFIO ports, on units that have them, changes the receiver performance of the instrument.

Key Path	Input/Output, RF Input
Remote Command	`[:SENSe]:FEED:RF:PORT[:INPut] RFIN | RFIN2 | RFIO1 | RFIO2 | RFIO3 | RFIO4` `[:SENSe]:FEED:RF:PORT[:INPut]?`
Example	:FEED:RF:PORT RFIN
Dependencies	This key only appears in models that support multiple inputs. If the SCPI command is sent with unsupported parameters in any other model, an error is generated, –221.1900, “Settings conflict;option not installed” When any input is selected in a measurement that does not support it, the "No result; Meas invalid with this input" error condition occurs, and the measurement returns invalid data when queried.
Preset	This is unaffected by Mode Preset but is set to RF on a "Restore Input/Output Defaults" or "Restore System Defaults -> All"
State Saved	Saved in instrument state
Readback	The current RF Input Port selected is read back to this key

Backwards Compatibility SCPI	`INPut<1|2>:TYPE INPUT1 | INPUT2`
	`INPut<1|2>:TYPE?`
	Included for R&S ESU compatibility. In the MXE, the INPUT1 parameter is aliased to RFIN and the INPUT2 parameter is aliased to RFIN2

Initial S/W Revision	A.05.01
Modified at S/W Revision	A.14.00

RF Input

Specifies using the main RF port for the current measurement

Key Path	Input/Output, RF Input, RF Input Port
Example	:FEED:RF:PORT RFIN
Notes	On E6640A with hardware M9430A, if RF Input is selected as RF Input Port, you need to choose the settings in the Half Duplex Config menu to determine which port (RFIO3 or RFIO4) will be used. On E6640A with hardware M9431A, this setting is not supported. If the SCPI command is sent with this setting, an error is generated, –221, "Settings conflict;option not installed"
ReadBack	RF Input
Initial S/W Revision	A.05.01
Modified at S/W Revision	A.14.00

RFIO1

Specifies using the RFIO 1 port for the current measurement

Key Path	Input/Output, RF Input, RF Input Port
Example	:FEED:RF:PORT RFIO1
Dependencies	RFIO1 is not available inE6607C. If Multiport Adapter is ON, Select RF Input to RFIO1, an error message is generated: "–221, Settings conflict; RFIO1 or RFIO2 Port unavailable when Multiport Adapter is ON".
ReadBack	RFIO 1
Initial S/W Revision	A.05.01

RFIO2

Specifies using the RFIO 2 port for the current measurement

Key Path	Input/Output, RF Input, RF Input Port
Example	:FEED:RF:PORT RFIO2
Dependencies	RFIO2 is not available inE6607C. If Multiport Adapter is ON, Select RF Input to RFIO2, an error message is generated: "–221, Settings conflict; RFIO1 or RFIO2 Port unavailable when Multiport Adapter is ON".
ReadBack	RFIO 2
Initial S/W Revision	A.05.01

External Gain

Compensates for gain or loss in the measurement system outside the spectrum analyzer. The External Gain is subtracted from the amplitude readout (or the loss is added to the amplitude readout). So, the displayed signal level represents the signal level at the output of the device-under-test, which can be the input of an external device that provides gain or loss.

Entering an External Gain value does not affect the Reference Level, therefore the trace position on screen changes, as do all of the values represented by the trace data. Thus, the values of exported trace data, queried trace data, marker amplitudes, trace data used in calculations such as N dB points, trace math, peak threshold, etc., are all affected by External Gain. Changing the External Gain, even on a trace that is not updating, will immediately change all of the above, without new data needing to be taken.

NOTE **Changing the External Gain causes the analyzer to immediately stop the current sweep and prepare to begin a new sweep. The data will not change until the trace data updates because the offset is applied to the data as it is taken. If a trace is exported with a nonzero External Gain, the exported data will contain the trace data with the offset applied.**

In the Spectrum Analyzer mode, a Preamp is the common external device providing gain or loss. In a measurement application mode like GSM or W-CDMA, the gain or loss could be from a BTS (Base Transceiver Station) or an MS (Mobile Station). So in the Spectrum Analyzer mode MS and BTS would be grayed out and the only choice would be Ext Preamp. Similarly in some of the digital communications applications, Ext Preamp will be grayed out and you would have a choice of MS or BTS.

Key Path	Input/Output
Couplings	The Ext Preamp, MS, and BS keys may be grayed out depending on which measurement is currently selected. If any of the grayed out keys are pressed, or the equivalent SCPI command is sent, an advisory message is generated.
Readback	1-of-N selection | [variable]
Initial S/W Revision	Prior to A.02.00

Ext Preamp

This function is similar to the reference level offset function. Both affect the displayed signal level. Ref Lvl Offset is a mathematical offset only, no analyzer configuration is affected. Ext Preamp gain is used when determining the auto-coupled value of the Attenuator. The External Gain value and the Maximum Mixer Level settings are both part of the automatic setting equation for the RF attenuation setting. (10 dB of Attenuation is added for every 10 dB of External Gain.)

Note that the Ref Lvl Offset and Maximum Mixer Level are described in the Amplitude section. They are reset by the instrument Preset. The External Preamp Gain is reset by the "Restore Input/Output Defaults" or "Restore System Defaults->All functions. . The External Gain is subtracted from the amplitude readout so that the displayed signal level represents the signal level at the output of the device-under-test, which is the input of the external device that is providing gain or loss.

"More Information" on page 124

Key Path	Input/Output, External Gain

Remote Command	`[:SENSe]:CORRection:SA[:RF]:GAIN <rel_ampl>` `[:SENSe]:CORRection:SA[:RF]:GAIN?`
Example	CORR:SA:GAIN 10 sets the Ext Gain value to 10 dB CORR:SA:GAIN –10 sets the Ext Gain value to –10 dB (that is, an attenuation of 10 dB)
Notes	Does not auto return.
Dependencies	The reference level limits are determined in part by the External Gain/Atten, Max Mixer Level, and RF Atten. This key is grayed out in Modes that do not support External Gain
Preset	This is unaffected by Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved	Saved in instrument state
Min	–120 dB
Max	120 dB
Readback	Preamp Gain, <Ext Gain value> dB
Backwards Compatibility SCPI	`[:SENSe]:CORRection:OFFSet[:MAGNitude]` The legacy "Ext Preamp Gain" key is now called "Ext Gain" and the sub-menu has choices of Ext Preamp | MS | BTS for backwards compatibility.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

More Information

The U7227A USB Preamplifier is an accessory for the X-Series Signal Analyzer that provides gain externally, and whose gain settings are automatically loaded into the analyzer over USB whenever it is connected to one of the analyzer's USB ports.

While the USB Preamplifier is plugged into one of the analyzer's USB ports, the analyzer will consider it to be in the signal path of the RF Input and will apply the calibration data from the USB Preamp to measurements taken at the RF Input (on 2 input boxes, it will be considered to be in the signal path of RF Input 1; it is not supported for RF Input 2).

The USB Preamplifier contains its own cal data. This includes a noise trace suitable for use with NFE, for those models which support NFE. The act of connecting the Preamp to USB will cause the cal data to be downloaded from the preamp. When this happens an informational message is provided saying "Cal data loaded from USB Preamp". The analyzer will then automatically apply the calibration factors loaded from the Preamp in any measurement that supports the USB Preamp.

The External Preamp Gain setting may still be used, even though it is not required for the USB Preamp (since the USB Preamp supplies its own gain data to the analyzer which is applied automatically). Connecting the USB Preamp does not change the External Preamp Gain setting, however unless you have another gain or attenuation element in the signal path, the appropriate setting for External Preamp Gain is 0 dB.

Overload detection and reporting will apply when the USB preamplifier is connected to USB. The USB Preamplifier has its own overload detector which reports overloads to the instrument over USB. This generates an error condition, “Input Overload;USB Preamp.”

If, while the USB Preamp is connected to USB, a measurement is selected that does not support the USB preamplifier, the "No result; Meas invalid with Preamp" error condition is generated.

MS

Sets an external gain/attenuation value for MS (Mobile Station) tests.

Key Path	Input/Output, External Gain
Remote Command	`[:SENSe]:CORRection:MS[:RF]:GAIN <rel_ampl>` `[:SENSe]:CORRection:MS[:RF]:GAIN?`
Example	CORR:MS:GAIN 10 sets the Ext Gain value to 10 dB CORR:MS:GAIN –10 sets the Ext Gain value to –10 dB (that is, a loss of 10 dB.)
Notes	Does not auto return.
Dependencies	The reference level limits are determined in part by the External Gain, Max Mixer Level, RF Atten This key is grayed out in modes that do not support MS.
Preset	This is unaffected by a Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved	Saved in instrument state.
Min	–100 dB
Max	100 dB
Readback	MS, <Ext Gain value> dB
Initial S/W Revision	Prior to A.02.00

Remote Command	`[:SENSe]:CORRection:MS[:RF]:LOSS <rel_ampl>` `[:SENSe]:CORRection:MS[:RF]:LOSS?`
Example	CORR:MS:LOSS 10 sets the Ext Gain value to –10 dB, and subsequently querying :LOSS will give 10 dB CORR:MS:LOSS –10 sets the Ext Gain value to 10 dB, and subsequently querying :LOSS will give –10 dB
Notes	A positive value of <rel_ampl> in the above command means a loss and a negative value indicates a gain. Anytime :LOSS is set it sets :GAIN to the negative value of the parameter sent. Anytime :LOSS is queried it gives the negative of :GAIN
Preset	This is unaffected by a Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Min	100 dB
Max	–100 dB
Initial S/W Revision	Prior to A.02.00

BTS

Sets an external attenuation value for BTS (Base Transceiver Station) tests.

Key Path	Input/Output, External Gain
Remote Command	`[:SENSe]:CORRection:BTS[:RF]:GAIN <rel_ampl>` `[:SENSe]:CORRection:BTS[:RF]:GAIN?`
Example	CORR:BTS:GAIN 10 sets the Ext Gain value to 10 dB CORR:BTS:GAIN –10 sets the Ext Gain value to –10 dB (that is, a loss of 10 dB.)
Notes	Does not auto return.
Dependencies	The reference level limits are determined in part by the External Gain, Max Mixer Level, RF Atten This key is grayed out in modes that do not support BTS.
Preset	This is unaffected by a Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved	Saved in instrument state.
Min	–100 dB
Max	100 dB
Readback	BTS, <Ext Gain value> dB
Initial S/W Revision	Prior to A.02.00

Remote Command	`[:SENSe]:CORRection:BTS[:RF]:LOSS <rel_ampl>` `[:SENSe]:CORRection:BTS[:RF]:LOSS?`
Example	CORR:BTS:LOSS 10 sets the Ext Gain value to –10 dB, and subsequently querying :LOSS will give 10 dB CORR:BTS:LOSS –10 sets the Ext Gain value to 10 dB, and subsequently querying :LOSS will give –10 dB
Notes	A positive value of <rel_ampl> in the above command means a loss and a negative value indicates a gain. Anytime :LOSS is set it sets :GAIN to the negative value of the parameter sent. Anytime :LOSS is queried it gives the negative of :GAIN
Preset	This is unaffected by a Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Min	100 dB
Max	–100 dB
Initial S/W Revision	Prior to A.02.00

Restore Input/Output Defaults

This selection causes the group of settings and data associated with the Input/Output key to be a reset to their default values. In addition, when a Source is installed, licensed and selected, Restore Input/Output defaults will initiate a Source Preset.

This level of Restore System Defaults does not affect any other system settings or mode settings and does not cause a mode switch. All the features described in this section are reset using this key, including Input Corrections and Data (described in the Corrections section).

Key Path	Input/Output
Example	:SYST:DEF INP presets all the Input/Output variables to their factory default values.
Notes	Refer to the Utility Functions for information about Restore System Defaults and the complete description of the :SYSTem:DEFault INPut: command.
Initial S/W Revision	Prior to A.02.00

Corrections

This key accesses the Amplitude Corrections menu.

Amplitude Corrections arrays can be entered, sent over SCPI, or loaded from a file. They allow you to correct the response of the analyzer for various use cases. The X-series supports four separate Corrections arrays, each of which can contain up to 2000 points. They can be turned on and off individually and any or all can be on at the same time.

Trace data is in absolute units and corrections data is in relative units, but we want to be able to display trace data at the same time as corrections data. Therefore we establish a reference line to be used while building or editing a Corrections table. The reference line is halfway up the display and represents 0 dB of correction. It is labeled “0 dB CORREC”. It is drawn in blue.

Corrections data is always in dB. Whatever dB value appears in the correction table represents the correction applied to that trace at that frequency. So if a table entry shows 30 dB that means we ADD 30 dB to each trace to correct it before displaying it.

In zero span, where the frequency is always the center frequency of the analyzer, we apply the (interpolated) correction for the center frequency to all points in the trace. In the event where there are two correction amplitudes at the center frequency, we apply the first one in the table.

Note that the corrections are applied as the data is taken; therefore, a trace in View (Update Off) will not be affected by changes made to the corrections table after the trace is put in View.

On the RF Input/Output panel, there are two full-duplex RF ports (RFIO1 and RFIO2), RF Input and RF Output. When RF Input is selected, it will correspond to one input port from two half-duplex RF ports(RFIO3 and RFIO4), and when RF Output is selected, it will correspond to one output port from two half-duplex RF ports(RFIO3 and RFIO4). So there are 8 sets of corrections in all that can be applied to the RF ports. Ports cannot share the same set of corrections but a single port can have multiple corrections applied to it. The correction data is applied to incomming signals as well as transmitted signals and is in the form of a list of spot frequencies and amplitude correction levels.

Key Path	Input/Output, Corrections
Mode	SA, I/Q Analyzer, Phase Noise, VXA, RTSA, EMI Receiver, DVB-T/H, DTMB, DVB-T/H, DTMB, W-CDMA, LTE & LTE-Adv FDD, LTE & LTE-Adv TDD, Sequence Analyzer, BTooth
Dependencies	This key will only appear if you have the proper option installed in your instrument. Amplitude correction may not be available in all modes; if a mode does not support amplitude correction, the Corrections key should be blanked while in that mode. If an application supports corrections but the current measurement does not, then the key should be grayed out in that measurement
Preset	Corrections arrays are reset (deleted) by Restore Input/Output Defaults. They survive shutdown and restarting of the analyzer application, which means they will survive a power cycle.
Initial S/W Revision	A.02.00
Modified at S/W Revision	x.14.50

Select Correction

Specifies the selected correction. The term "selected correction" is used throughout this document to specify which correction will be affected by the functions.

Key Path	Input/Output, Corrections
Mode	SA, I/Q Analyzer, Phase Noise, VXA, RTSA, EMI Receiver, DVB-T/H, DTMB, DVB-T/H, DTMB, W-CDMA, LTE & LTE-Adv FDD, LTE & LTE-Adv TDD, Sequence Analyzer, BTooth
Notes	The selected correction is remembered even when not in the correction menu.
Preset	Set to Correction 1 by Restore Input/Output Defaults
Readback	Correction 1|Correction 2|Correction 3|Correction 4|Correction 5|Correction 6|Correction7|Correction8
Initial S/W Revision	A.02.00
Modified at S/W Revision	x.14.50

Correction On/Off

Turning the Selected Correction from the OFF state to the ON state allows the values in it to be applied to the data. This state transition also automatically turns on "Apply Corrections" (sets it to ON), otherwise the correction would not take effect.

A new sweep is initiated if an amplitude correction is switched on or off. Note that changing, sending or loading corrections data does NOT directly initiate a sweep, however in general these operations will turn corrections on, which DOES initiate a sweep.

Key Path	Input/Output, Corrections
Remote Command	`[:SENSe]:CORRection:CSET[1]|2|...|8[:STATe] ON|OFF|1|0` `[:SENSe]:CORRection:CSET[1]|2|...|8[:STATe]?`

Example	SENS:CORR:CSET1 ON
Dependencies	Changing this from the OFF state to the ON state automatically turns on "Apply Corrections". Only the first correction array (Correction 1) supports antenna units. When this array is turned on, and it contains an Antenna Unit other than “None”, the Y Axis Unit of the analyzer is forced to that Antenna Unit. All other Y Axis Unit choices are grayed out. Note that this means that a correction file with an Antenna Unit can only be loaded into the Corrections 1 register. Consequently only for Correction 1 does the dropdown in the Recall dialog include.ant, and if an attempt is made to load a correction file into any other Correction register which DOES contain an antenna unit, a Mass Storage error is generated. This command will generate an “Option not available” error unless you have the proper option installed in your instrument.
Preset	Not affected by a Preset. Set to OFF by Restore Input/Output Defaults
State Saved	Saved in instrument state.
Backwards Compatibility Notes	Unlike legacy analyzers, Preset does not turn Corrections off (Restore Input/Output Defaults does).
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.14.00

Properties

Accesses a menu that lets you set the properties of the selected correction.

Key Path	Input/Output, Corrections
Initial S/W Revision	A.02.00

Select Correction

Specifies the selected correction. The term "selected correction" is used throughout this document to specify which correction will be affected by the functions.

Key Path	Input/Output, Corrections
Mode	SA, I/Q Analyzer, Phase Noise, VXA, RTSA, EMI Receiver, DVB-T/H, DTMB, DVB-T/H, DTMB, W-CDMA, LTE & LTE-Adv FDD, LTE & LTE-Adv TDD, Sequence Analyzer, BTooth
Notes	The selected correction is remembered even when not in the correction menu.
Preset	Set to Correction 1 by Restore Input/Output Defaults
Readback	Correction 1|Correction 2|Correction 3|Correction 4|Correction 5|Correction 6|Correction7|Correction8
Initial S/W Revision	A.02.00
Modified at S/W Revision	x.14.50

Antenna Unit

For devices (like antennas) that make measurements of field strength or flux density, the correction array should contain within its values the appropriate conversion factors such that, when the data on the analyzer is presented in dBµV, the display is calibrated in the appropriate units. The "Antenna Unit" used for the conversion is contained within the corrections array database. It may be specifiedor loaded in from an external file or SCPI.

When an array with an Antenna Unit other than "None" is turned on, the Y Axis Unit of the analyzer is forced to that unit. When this array is turned on, and it contains an Antenna Unit other than “None”, the Y Axis Unit of the analyzer is forced to that Antenna Unit., and all other Y Axis Unit choices are grayed out.

Antenna Unit does not appear in all Modes that support Corrections. Only the modes listed in the Mode row of the table below support Antenna Units.

Key Path	Input/Output, Corrections, Properties
Mode	SA, I/Q Analyzer, Phase Noise, VXA, RTSA, EMI Receiver, DVB-T/H, DTMB, DVB-T/H, DTMB, W-CDMA, LTE & LTE-Adv FDD, LTE & LTE-Adv TDD, Sequence Analyzer, BTooth
Remote Command	`[:SENSe]:CORRection:CSET[1]:ANTenna[:UNIT] GAUSs | PTESla | UVM | UAM | UA | NOConversion` `[:SENSe]:CORRection:CSET[1]:ANTenna[:UNIT]?`
Example	CORR:CSET:ANT GAUS
Dependencies	Only the first correction array (Correction 1) supports antenna units. Note that this means that a correction file with an Antenna Unit can only be loaded into the Corrections 1 register. Consequently only for Correction 1 does the dropdown in the Recall dialog include.ant, and if an attempt is made to load a correction file into any other Correction register which DOES contain an antenna unit, a Mass Storage error is generated.
Preset	Unaffected by Preset. Set to NOC by Restore Input/Output Defaults
State Saved	Saved in instrument state
Initial S/W Revision	A.02.00
Modified at S/W Revision	x.14.50

None

Selects no antenna unit for this Correction set. Thus no Y Axis unit will be forced.

Key Path	Input/Output, Corrections, Properties, Antenna Unit
Example	:CORR:CSET:ANT NOC
Readback	"None"
Initial S/W Revision	A.02.00

dBµV/m

Sets the antenna unit to dBµV/m. If this correction is turned on, and Apply Corrections is on, the Y Axis Unit will then be forced to dBµV/m and all other Y Axis Unit selections will be grayed out.

Key Path	Input/Output, Corrections, Properties, Antenna Unit
Example	:CORR:CSET:ANT UVM
Readback	"dBµV/m"
Initial S/W Revision	A.02.00

dBµA/m

Sets the antenna unit to dBµA/m. If this correction is turned on, and Apply Corrections is on, the Y Axis Unit will then be forced to dBµA/m and all other Y Axis Unit selections will be grayed out.

Key Path	Input/Output, Corrections, Properties, Antenna Unit
Example	:CORR:CSET:ANT UVA
Readback	" dBµA/m"
Initial S/W Revision	A.02.00

dBpT

Sets the antenna unit to dBpT. If this correction is turned on, and Apply Corrections is on, the Y Axis Unit will then be forced to dBpT and all other Y Axis Unit selections will be grayed out.

Key Path	Input/Output, Corrections, Properties, Antenna Unit
Example	:CORR:CSET:ANT PTES
Readback	"dBpT"
Initial S/W Revision	A.02.00

dBG

Sets the antenna unit to dBG. If this correction is turned on, and Apply Corrections is on, the Y Axis Unit will then be forced to dBG and all other Y Axis Unit selections will be grayed out.

Key Path	Input/Output, Corrections, Properties, Antenna Unit
Example	:CORR:CSET:ANT GAUS
Readback	" dBG"
Initial S/W Revision	A.02.00

dBµA

Sets the antenna unit to dBµA. If this correction is turned on, and Apply Corrections is on, the Y Axis Unit will then be forced to dBµA and all other Y Axis Unit selections will be grayed out.

Key Path	Input/Output, Corrections, Properties, Antenna Unit
Example	:CORR:CSET:ANT UA
Readback	" dBµA"
Initial S/W Revision	A.11.00

Frequency Interpolation

This setting controls how the correction values per-bucket are calculated. We interpolate between frequencies in either the logarithmic or linear scale.

This setting is handled and stored individually per correction set.

See "Interpolation" on page 132

Key Path	Input/Output, Corrections, Properties
Remote Command	`[:SENSe]:CORRection:CSET[1]|2|...|8:X:SPACing LINear | LOGarithmic` `[:SENSe]:CORRection:CSET[1]|2|...|8:X:SPACing?`
Example	CORR:CSET:X:SPAC LIN
Preset	Unaffected by a Preset. Set to Linear by Restore Input/Output Defaults.
State Saved	Saved in instrument state.
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.14.00

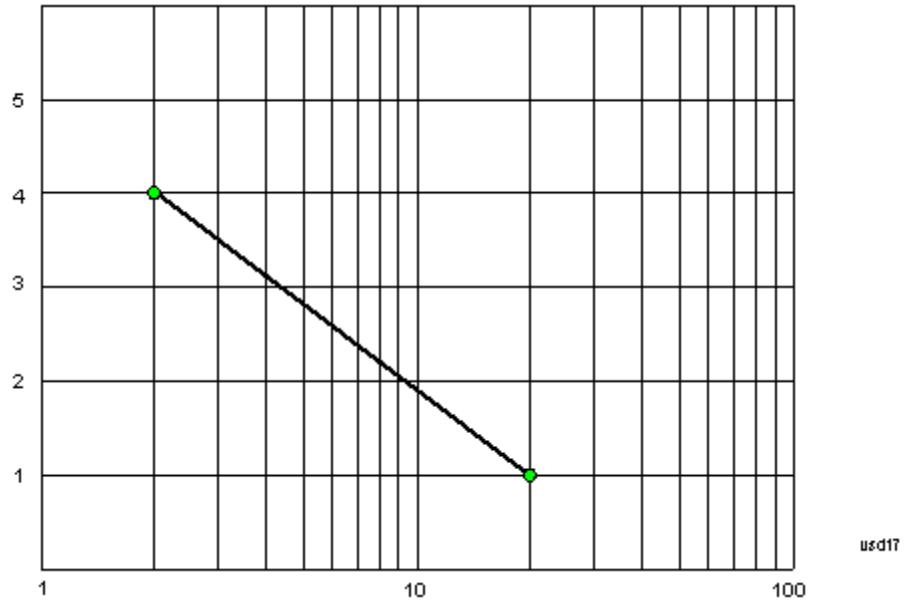
Interpolation

For each bucket processed by the application, all of the correction factors at the frequency of interest (center frequency of each bucket) are summed and added to the amplitude. All trace operations and post processing treat this post-summation value as the true signal to use.

To effect this correction, the goal, for any particular start and stop frequency, is to build a correction trace, whose number of points matches the current Sweep Points setting of the instrument, which will be used to apply corrections on a bucket by bucket basis to the data traces.

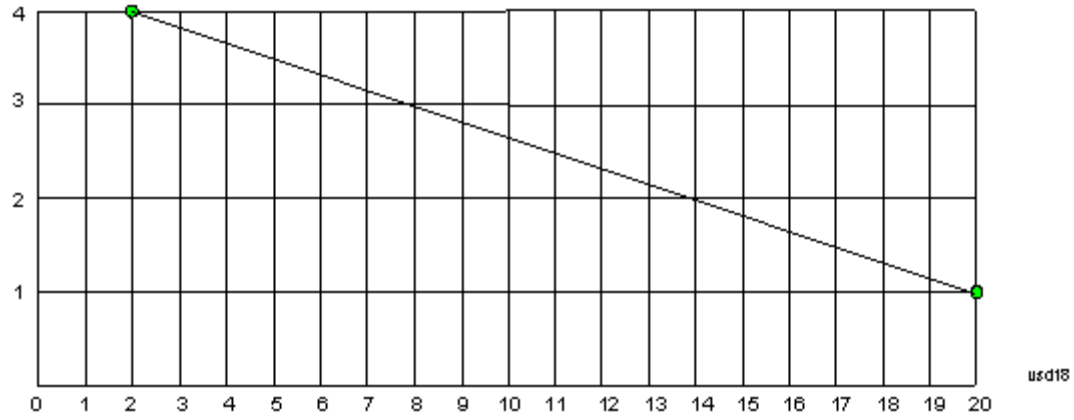
For amplitudes that lie between two user specified frequency points, we interpolate to determine the amplitude value. You may select either linear or logarithmic interpolation between the frequencies.

If we interpolate on a log scale, we assume that the line between the two points is a straight line on the log scale. For example, let's say the two points are (2,4) and (20,1). A straight line between them on a log scale looks like:



On a linear scale (like that of the spectrum analyzer), this translates to:

If we interpolate on a linear scale, we assume that the two points are connected by a straight line on the linear scale, as below:



The correction to be used for each bucket is taken from the interpolated correction curve at the center of the bucket.

Description

Sets an ASCII description field which will be stored in an exported file. Can be displayed in the active function area by selecting as the active function, if desired to appear in a screen capture.

Key Path	Input/Output, Corrections, Properties
Remote Command	`[:SENSe]:CORRection:CSET[1]|2|...|8:DESCription "text"` `[:SENSe]:CORRection:CSET[1]|2|...|8:DESCription?`
Example	:CORR:CSET1:DESC "11941A Antenna correction"
Notes	45 chars max; may not fit on display if max chars used
Preset	Unaffected by a Preset. Set to empty by Restore Input/Output Defaults
State Saved	Saved in instrument state.
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.14.00

Comment

Sets an ASCII comment field which will be stored in an exported file. Can be displayed in the active function area by selecting as the active function, if desired to appear in a screen capture.

Key Path	Input/Output, Corrections, Properties
Remote Command	`[:SENSe]:CORRection:CSET[1]|2|...|8:COMMent "text"` `[:SENSe]:CORRection:CSET[1]|2|...|8:COMMent?`
Example	:CORR:CSET1:COMM "this is a comment"
Notes	60 chars max; may not fit on display if max chars used
Preset	Unaffected by Preset. Set to empty by Restore Input/Output Defaults
State Saved	Saved in instrument state
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.14.00

RF Port

Maps one of the sets of corrections to one of the IO ports.

Key Path	Input/Output, Corrections, Properties
Mode	SEQAN
Remote Command	`[:SENSe]:CORRection:CSET[1]|2|...|8:RF:PORT RFIN | RFIO1 | RFIO2 | RFOut | GPSout | GNSSout | RFIO3 | RFIO4` `[:SENSe]:CORRection:CSET[1]|2|...|8:RF:PORT?`

Example	:CORR:CSET:RF:PORT RFIN
Remote Command Notes	
Dependencies	RFIO1 and RFIO2 are not available in E6607C and E6630A GPSout (GNSSout) are only available in E6607C and E6630A RFIO3 and RFIO4 are only available on E6640A with hardware M9431A. RFIN and RFOut are not available on E6640A with hardware M9431A
Couplings	
Preset	Unaffected by Preset. Set to RF by Restore Input/Output Defaults
State Saved	Saved in State
Initial S/W Revision	A.05.01
Modified at S/W Revision	A.14.00

RF Input

The port that the current corrections will be applied to.

Key Path	Input/Output, Corrections, Properties, RF Port
Example	:CORR:CSET:RF:PORT RFIN
Dependencies	Not available in E6607C Not available on E6640A with hardware M9431A
ReadBack	RF IN
Initial S/W Revision	A.05.01
Modified at S/W Revision	A.14.00

RFOut

The port that the current corrections will be applied to.

Key Path	Input/Output, Corrections, Properties, RF Port
Example	:CORR:CSET:RF:PORT RFO
Dependencies	Not available in E6607C Not available on E6640A with hardware M9431A
ReadBack	RFOut
Initial S/W Revision	A.05.01
Modified at S/W Revision	A.14.00

RFIO1

The port that the current corrections will be applied to. Pressing this key again allows the user access to the menu for specifying which internal device the corrections for RFIO 1 will be applied to.

Key Path	Input/Output, Corrections, Properties, RF Port
Remote Command	`[:SENSe]:CORRection:CSET[1]|2|...|8:RF:PORT:RFIO1 SOURce | ANALyzer | BOTH` `[:SENSe]:CORRection:CSET[1]|2|...|8:RF:PORT:RFIO1?`
Example	:CORR:CSET:RF:PORT:RFIO1 BOTH
Preset	Both
State Saved	Saved in State

Correct Source

Sets the corrections for the RFIO1 port to be applied to the source.

Key Path	Input/Output, Corrections, Properties, RF Port
Example	:CORR:CSET:RF:PORT:RFIO1 SOUR
Readback	"Correct Source"

Correct Analyzer

Sets the corrections for the RFIO1 port to be applied to the analyzer.

Key Path	Input/Output, Corrections, Properties, RF Port
Example	:CORR:CSET:RF:PORT:RFIO1 ANAL
Readback	"Correct Analyzer"

Correct Source and Analyzer

Sets the corrections for the RFIO1 port to be applied to both the source and the analyzer.

Key Path	Input/Output, Corrections, Properties, RF Port
Example	:CORR:CSET:RF:PORT:RFIO1 BOTH
Readback	"Correct Source and Analyzer"

RFIO2

The port that the current corrections will be applied to. Pressing this key again allows the user access to the menu for specifying which internal device the corrections for RFIO 2 will be applied to.

Key Path	Input/Output, Corrections, Properties, RF Port
Remote Command	`[:SENSe]:CORRection:CSET[1]|2|...|8:RF:PORT:RFIO2 SOURce | ANALyzer | BOTH` `[:SENSe]:CORRection:CSET[1]|2|...|8:RF:PORT:RFIO2?`
Example	:CORR:CSET:RF:PORT:RFIO2 BOTH
Preset	Both
State Saved	Saved in State

Correct Source

Sets the corrections for the RFIO2 port to be applied to the source.

Key Path	Input/Output, Corrections, Properties, RF Port
Example	:CORR:CSET:RF:PORT:RFIO2 SOUR
Readback	"Correct Source"

Correct Analyzer

Sets the corrections for the RFIO2 port to be applied to the analyzer.

Key Path	Input/Output, Corrections, Properties, RF Port
Example	:CORR:CSET:RF:PORT:RFIO2 ANAL
Readback	"Correct Analyzer"

Correct Source and Analyzer

Sets the corrections for the RFIO2 port to be applied to both the source and the analyzer.

Key Path	Input/Output, Corrections, Properties, RF Port
Example	:CORR:CSET:RF:PORT:RFIO2 BOTH
Readback	"Correct Source and Analyzer"

Edit

Invokes the integrated editing facility for this correction set.

When entering the menu, the editor window turns on, the selected correction is turned On, Apply Corrections is set to On, the amplitude scale is set to Log, and the Amplitude Correction (“Ampcor”) trace is displayed. The actual, interpolated correction trace is shown in green for the selected correction. Note that since the actual interpolated correction is shown, the correction trace may have some curvature to it. This trace represents only the correction currently being edited, rather than the total, accumulated amplitude

correction for all amplitude corrections which are currently on, although the total, accumulated correction for all corrections which are turned on is still applied to the data traces.

Because corrections data is always in dB, but the Y-axis of the analyzer is in absolute units, it is necessary to establish a reference line for display of the Corrections data. The reference line is halfway up the display and represents 0 dB of correction. It is labeled “0 dB CORREC”. It is drawn in blue.

Corrections data is always in dB. Whatever dB value appears in the correction table represents the correction to be applied to that trace at that frequency. So if a table entry shows 30 dB that means we ADD 30 dB to each trace to correct it before displaying it. By definition all points are connected. If a gap is desired for corrections data, enter 0 dB.

Note that a well-designed Corrections array should start at 0 dB and end at 0 dB. This is because whatever the high end point is will be extended to the top frequency of the instrument, and whatever the low end point is will be extended down to 0 Hz. So for a Corrections array to have no effect outside its range, you should start and end the array at 0 dB.

NOTE **The table editor will only operate properly if the analyzer is sweeping, because its updates are tied to the sweep system. Thus, you should not try to use the editor in single sweep, and it will be sluggish during compute-intensive operations like narrow-span FFT sweeps.**

When exiting the edit menu (by using the Return key or by pressing an instrument front-panel key), the editor window turns off and the Ampcor trace is no longer displayed; however, Apply Corrections remains On, any correction that was on while in the editor remains on, and the amplitude scale returns to its previous setting.

Corrections arrays are not affected by a Preset, because they are in the Input/Output system. They also survive shutdown and restarting of the analyzer application, which means they will survive a power cycle.

When editing a correction, the editor remembers which correction and which element in the correction array you were editing, and returns you to that correction and that element when you return to the editor after leaving it.

Key Path	Input/Output, Corrections
Initial S/W Revision	A.02.00

Navigate

Lets you move through the table to edit the desired point.

Key Path	Input/Output, Corrections, Edit
Notes	There is no value readback on the key
Min	1
Max	2000
Initial S/W Revision	A.02.00

Frequency

Lets you edit the frequency of the current row.

Key Path	Input/Output, Corrections, Edit
Notes	There is no value readback on the key.
Min	0
Max	1 THz
Initial S/W Revision	A.02.00

Amplitude

Lets you edit the Amplitude of the current row.

Key Path	Input/Output, Corrections, Edit
Notes	There is no value readback on the key.
Min	–1000 dB
Max	1000 dB
Initial S/W Revision	A.02.00

Insert Point Below

Inserts a point below the current point. The new point is a copy of the current point and becomes the current point. The new point is not yet entered into the underlying table, and the data in the row is displayed in light gray.

Key Path	Input/Output, Corrections, Edit
Initial S/W Revision	A.02.00

Delete Point

Deletes the currently-selected point, whether or not that point is being edited, and selects the Navigate functionality. The point following the currently-selected point (or the point preceding if there is none) will be selected.

Key Path	Input/Output, Corrections, Edit
Initial S/W Revision	A.02.00

Delete Correction

Deletes the correction values for this set. When this key is pressed a prompt is placed on the screen that says “Please press Enter or OK key to delete correction. Press ESC or Cancel to close this dialog.” The

deletion is only performed if you press OK or Enter.

Key Path	Input/Output, Corrections
Remote Command	`[:SENSe]:CORRection:CSET[1]|2|...|6:DELete`
Example	CORR:CSET:DEL CORR:CSET1:DEL CORR:CSET4:DEL
Notes	Pressing this key when no corrections are present is accepted without error.
Initial S/W Revision	A.02.00

Apply Corrections

Applies amplitude corrections, which are marked as ON to the measured data. If this is set to OFF, then no amplitude correction sets will be used, regardless of their individual on/off settings. If set to ON, the corrections that are marked as ON (see "Correction On/Off" on page 128) are used.

Key Path	Input/Output, Corrections
Remote Command	`[:SENSe]:CORRection:CSET:ALL[:STATe] ON|OFF|1|0` `[:SENSe]:CORRection:CSET:ALL[:STATe]?`
Example	SENS:CORR:CSET:ALL OFF This command makes sure that no amplitude corrections are applied, regardless of their individual on/off settings.
Preset	Not affected by Preset. Set to OFF by Restore Input/Output Defaults
State Saved	Saved in instrument state.
Initial S/W Revision	A.02.00

Delete All Corrections

Erases all correction values for all 4 Amplitude Correction sets.

When this key is pressed a prompt is placed on the screen that says “Please press Enter or OK key to delete all corrections. Press ESC or Cancel to close this dialog.” The deletion is only performed if you press OK or Enter.

Key Path	Input/Output, Corrections
Remote Command	`[:SENSe]:CORRection:CSET:ALL:DELete`
Example	CORR:CSET:ALL:DEL
Initial S/W Revision	A.02.00

Remote Correction Data Set Commands

This section describes the remote (SCPI) commands used to put values into correction sets. See the correction / table editor section of the Input/Output section for the information on front panel entry of correction data.

"Set (Replace) Data (Remote Command Only)" on page 141

"Merge Correction Data (Remote Command Only)" on page 141

Set (Replace) Data (Remote Command Only)

The command takes an ASCII series of alternating frequency and amplitude points, each value separated by commas.

The values sent in the command will totally replace all existing correction points in the specified set.

An Ampcor array can contain 2000 points maximum.

Remote Command	`[:SENSe]:CORRection:CSET[1]|2|...|8:DATA <freq>, <ampl>, . . .` `[:SENSe]:CORRection:CSET[1]|2|...|8:DATA?`
Example	CORR:CSET1:DATA 10000000, –1.0, 20000000, 1.0 This defines two correction points at (10 MHz, –1.0 dB) and (20 MHz, 1.0 dB) for correction set 1.
Preset	Empty after Restore Input/Output Defaults. Survives a shutdown or restart of analyzer application (including a power cycle).
State Saved	Saved in instrument state.
Min	Freq: 0 Hz Amptd: –1000 dBm
Max	Freq: 1 THz Amptd: +1000 dBm
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.14.00

Merge Correction Data (Remote Command Only)

The command takes an ASCII series of alternating frequency and amplitude points, each value separated by commas. The difference between this command and Set Data is that this merges new correction points into an existing set.

Any new point with the same frequency as an existing correction point will replace the existing point's amplitude with that of the new point.

An Ampcor array can contain 2000 total points, maximum.

Remote Command	`[:SENSe]:CORRection:CSET[1]|2|...|8:DATA:MERGe <freq>, <ampl>, ...`
Example	CORR:CSET1:DATA:MERGE 15000000, –5.0, 25000000, 5.0 This adds two correction points at (15 MHz, –5.0 dB) and (25 MHz, 5.0 dB) to whatever values already exist in correction set 1.

Preset	Empty after Restore Input/Output Defaults. Survives shutdown/restart of analyzer application (including power cycle)
Min	Freq: 0 Hz Amptd: –1000 dBm
Max	Freq: 1 THz Amptd: +1000 dBm
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.14.00

Freq Ref In

Specifies the frequency reference as being the internal reference at the rear panel input labeled EXT REF IN, a 1 pulse per second signal at the EXT REF IN input,, external reference or sensing the presence of a signal at the EXT REF IN input.

When the frequency reference is set to internal, the internal 10 MHz reference is used even if an external reference is connected.

When the frequency reference is set to external, the instrument will use the external reference. However, if there is no external signal present, or it is not within the proper amplitude range, a condition error message is generated. When the external signal becomes valid, the error is cleared.

When the frequency reference is set to Pulse, the instrument expects a 1 pulse per second signal at the EXT REF IN input. The instrument uses this signal to adjust the frequency of the internal reference.

If Sense is selected, the instrument checks whether a signal is present at the external reference connector. If it senses a signal within 5 ppm of the External Ref Freq (as set on the External Ref Freq softkey), it will automatically switch to the external reference. If it senses a 1 pulse per second signal, it enters Pulse mode, wherein the signal is used to adjust the internal reference. When no signal is present, it automatically switches to the internal reference. No message is generated as the reference switches between pulse, external and internal. The monitoring of the external reference occurs approximately on 1 millisecond intervals, and never occurs in the middle of a measurement acquisition, only at the end of the measurement (end of the request).

If for any reason the instrument's frequency reference is not able to obtain lock, Status bit 1 in the Questionable Frequency register will be true and a condition error message is generated. When lock is regained, Status bit 1 in the Questionable Frequency register will be cleared and the condition error will be cleared.

If an external frequency reference is being used, you must enter the frequency of the external reference if it is not exactly 10 MHz. The External Ref Freq key is provided for this purpose.

NOTE:

A common frequency reference module serves all instrument instances, but only one instance of the software application can change the reference input type (INT or EXT or SENSE). The software application allowed to change the reference input is called the controlling instance; by default, the left most instrument instance is the controlling instance. This can be changed in the config file "E66XXModules.config" located under the folder E:\Agilent\Instrument. For the non-controlling instance

(s) the reference input types (in SCPI commands, and in the Virtual Front Panel menus) are blanked and unavailable for use.

Key Path	Input/Output
Remote Command	`[:SENSe]:ROSCillator:SOURce:TYPE INTernal | EXTernal | SENSe | PULSe` `[:SENSe]:ROSCillator:SOURce:TYPE?`
Dependencies	The PULSe parameter, and support of the 1 pps signal at the EXT REF IN input, are not available in firmware prior to A.13.00. They are also not available in some model numbers. If not available, the Pulse key will be blank, and sending the PULSe parameter via SCPI will generate an error:
Preset	This is unaffected by a Preset but is set to SENSe on a "Restore Input/Output Defaults" or "Restore System Defaults->All".
State Saved	Saved in instrument state.
Status Bits/OPC dependencies	STATus:QUEStionable:FREQuency bit 1 set if unlocked. Note: The status bit is not set for non-controlling instances. To determine if the frequency reference is unlocked, the controlling instance must be queried.
Backwards Compatibility Notes	Freq Ref In was not saved in state in the legacy instruments. It is a part of state in the X-Series.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

Remote Command	`[:SENSe]:ROSCillator:SOURce?`
Notes	The query [SENSe]:ROSCillator:SOURce? returns the current switch setting. This means: 1. If it was set to SENSe but there is no external reference nor 1pps signal so the instrument is actually using the internal reference, then this query returns INTernal and not SENSe. 2. If it was set to SENSe and there is an external reference present, the query returns EXTernal and not SENSe. 3. If it was set to SENSe and there is a 1 pps signal present, the query returns PULSe and not SENSe. 4. If it was set to EXTernal, then the query returns "EXTernal" 5. If it was set to INTernal, then the query returns “INTernal”. 6. If it was set to PULSe, then the query returns “PULSe” Note: The SCPI query always returns “INTernal” for non-controlling instances.
Preset	SENSe
Backwards Compatibility Notes	The query [:SENSe]:ROSCillator:SOURce? was a query-only command in ESA which always returned whichever reference the instrument was using. The instrument automatically switched to the ext ref if it was present. In PSA (which had no sensing) the command [:SENSe]:ROSCillator:SOURce set the reference (INT or EXT), so again its query returned the actual routing. Thus the query form of this command is 100% backwards compatible with both instruments.
Initial S/W Revision	Prior to A.02.00

Remote Command	`[:SENSe]:ROSCillator:SOURce INTernal|EXTernal`

Notes	For PSA compatibility the command form is provided and is directly mapped to [:SENSe]:ROSCillator:SOURce:TYPE Note: The SCPI command does nothing for non-controlling instances.
Initial S/W Revision	Prior to A.02.00

Sense

If Sense is selected, the instrument checks whether a signal is present at the external reference connector. If it senses a signal within 5 ppm of the External Ref Freq (as set on the External Ref Freq softkey), it will use this signal as an External Reference. If it senses a 1 pulse per second signal, it will use this signal to adjust the internal reference by adjusting the User setting of the Timebase DAC. When no signal is present, it automatically switches to the internal reference.

Key Path	Input/Output, Freq Ref In
Example	:ROSC:SOUR:TYPE SENS
Couplings	If set to SENSe and the analyzer senses a 1 pulse per second signal, it sets the System, Alignments, Timebase DAC setting to “User”. This setting survives Preset and Power Cycle but is set to “Calibrated” on a System, Restore Defaults, Align or a System, Restore Defaults, All
Readback	Sense
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

Internal

The internal reference is used. A 1 pps signal at the EXT REF IN port, or a signal there between 1 and 50 MHz, will cause a warning triangle to appear in the settings panel next to the word “INTERNAL”, but will otherwise be ignored.

Key Path	Input/Output, Freq Ref In
Example	:ROSC:SOUR:TYPE INT
Readback	Internal
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

External

The external reference is used.

Key Path	Input/Output, Freq Ref In
Example	:ROSC:SOUR:TYPE EXT
Readback	External
Initial S/W Revision	Prior to A.02.00

Ext Ref Freq

This key tells the analyzer the frequency of the external reference. When the external reference is in use (either because the reference has been switched to External or because the Reference has been switched to Sense and there is a valid external reference present) this information is used by the analyzer to determine the internal settings needed to lock to that particular external reference signal.

For the instrument to stay locked, the value entered must be within 5 ppm of the actual external reference frequency. So it is important to get it close, or you risk an unlock condition.

Note that this value only affects the instrument's ability to lock. It does not affect any calculations or measurement results. See "Freq Offset" in the Frequency section for information on how to offset frequency values.

Key Path	Input/Output, Freq Ref In
Remote Command	`[:SENSe]:ROSCillator:EXTernal:FREQuency <freq>` `[:SENSe]:ROSCillator:EXTernal:FREQuency?`
Example	ROSC:EXT:FREQ 20 MHz sets the external reference frequency to 20 MHz, but does not select the external reference. ROSC:SOUR:TYPE EXT selects the external reference.
Dependencies	Still available with Internal or Pulse selected, to allow setup for when External is in use. However, the setting has no effect if the Internal Reference is in use (Freq Ref In set to Internal, Pulse, or SENSE:INT or SENSE:PULSE).
Preset	This is unaffected by a Preset but is set to 10 MHz on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Min	1 MHz
Max	50 MHz
Default Unit	Hz
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

RF Output & Test Set Config

The RF Output & Test Set Config key allows you to set the RF Output Port and multiport adapter unit which is connected to the instrument by USB for download of calibration data and additional control.

This menu also allows you to set Trigger Config which is used to set the input/output type of the 4 Bi-directional Trigger ports.

Key Path	Input/Output
Preset	All settings under this key are returned to their default state when Restore Input/Output Defaults is pressed.
State Saved	Saved in State
Initial S/W Revision	A.09.49

RF Output

Specifies the RF Output Port used.

Switching from the RF Output port to one of the RFIO ports changes the transmitter performance of the instrument.

Key Path	Input/Output, RF Output & Test Set Config
Remote Command	`[:SENSe]:FEED:RF:PORT:OUTPut RFOut | RFIO1 | RFIO2 | GPSout | GNSSout | RFIO3 | RFIO4` `[:SENSe]:FEED:RF:PORT:OUTPut?`
Example	`:FEED:RF:PORT:OUTP RFIO1`
Preset	This is unaffected by Mode Preset but is set to RFOut on a "Restore Input/Output Defaults" or "Restore System Defaults -> All"
State Saved	Saved in State
Readback	The current RF Output Port selected is read back to this key
Initial S/W Revision	A.05.01
Modified at S/W Revision	A.14.00

RF Output

The RF port that will be used for the current output.

Key Path	Input/Output, RF Output & Test Set Config, RF Output
Example	:FEED:RF:PORT:OUTP RFO
Notes	On E6640A with hardware M9430A, if RF Output is selected as RF Output Port, you need to choose the settings in the Half Duplex Config menu to determine which port (RFIO3 or RFIO4) will be used. On E6640A with hardware M9431A, this setting is not supported. If the SCPI command is sent with this setting, an error is generated, –221, “Settings conflict;option not installed”
ReadBack	RF Output
Initial S/W Revision	A.05.01
Modified at S/W Revision	A.14.00

RFIO1

The RF port that will be used for the current output

Key Path	Input/Output, RF Output & Test Set Config, RF Output
Example	:FEED:RF:PORT:OUTP RFIO1
Dependencies	Not available in E6607C.
ReadBack	RFIO1
Initial S/W Revision	A.05.01

RFIO2

The RF port that will be used for the current output

Key Path	Input/Output, RF Output & Test Set Config, RF Output
Example	:FEED:RF:PORT:OUTP RFIO2
Dependencies	Not available in E6607C.
ReadBack	RFIO2
Initial S/W Revision	A.05.01

HalfDuplex Config

The HalfDuplex Config key allows you to set “RF Input” of RF Input Port menu and ”RF Output” of RF Output Port menu, which will correspond to RFIO3 and RFIO4.

Key Path	Input/Output, RF Output & Test Set Config
Dependencies	This menu is available on E6640A with hardware M9430A. It’s not available on E6640A with hardware M9431A.
State Saved	Saved in State
Initial S/W Revision	A.14.00

RF Input

Specify the RF Input port from RFIO3 and RFIO4.

Key Path	Input/Output, RF Output & Test Set Config, HalfDuplex Config
Remote Command	`[:SENSe]:HDUPlex:PORT:INPut RFIO3|RFIO4`
Example	:HDUPlex:PORT:INPut RFIO3 :HDUPlex:PORT:INPut?
Dependencies	If RFIO3 is selected as “RF Output”, then “RF Input” will be set to RFIO4 automatically. And if RFIO4

	is selected as “RF Output”, “RF Input” will be set to RFIO3 automatically.
Preset	RFIO3
State Saved	Saved in State
Initial S/W Revision	A.14.00

RF Output

Specify the RF Output port from RFIO3 and RFIO4.

Key Path	Input/Output, RF Output & Test Set Config, HalfDuplex Config
Remote Command	`[:SENSe]:HDUPlex:PORT:OUTPut RFIO3|RFIO4`
Example	:HDUPlex:PORT:OUTPut RFIO3 :HDUPlex:PORT:OUTPut?
Dependencies	If RFIO3 is selected as “RF Input”, then “RF Output” will be set to RFIO4 automatically. And if RFIO4 is selected as “RF Input”, “RF Output” will be set to RFIO3 automatically.
Preset	RFIO4
State Saved	Saved in State
Initial S/W Revision	A.14.00

LISN Control

Enables you to access LISN related functions. LISN control is only available with option LSN indicating that the LISN IO board is installed. This is a remote query command only.

V-network (Remote Command Only)

Enables you to select the V-network that is controlled via the AUX IO port.

Remote Command	`INPut[1]|2:LISN[:TYPE] FOURphase|ESH2Z5| ENV216 | OFF` `INPut[1]|2:LISN[:TYPE]?`
Example	:INP:LISN FOUR
Notes	FOURPhase and ESH2-Z5 R&S ESH2-Z5 (four phases and protective earth are controllable) ENV216 R&S ENV216 (two phases and highpass are controllable) OFF Remote control deactivated This query will return :- FOUR when ESH2-Z5 is selected.
Preset	Set to off on a "Restore Input/Output Defaults"
State Saved	Saved in instrument state
Initial S/W Revision	A.14.50

Phase (Remote Command Only)

This command enables you to select the phase of the V-network that is used, which is controlled via the AUX IO port. The permissible selection depends on the selected V-network.

Remote Command	`INPut[1]|2:LISN:PHASe L1|L2|L3|N` `INPut[1]|2:LISN:PHASe?`
Example	:INP:LISN:PHAS L1
Couplings	L2, L3 keys are grayed out when ENV216 is selected. If the grayed out key is pressed, an advisory message is generated. If the equivalent SCPI command is sent, this same message is generated as part of a “–224, Illegal parameter value; must apply ESH2Z5 to make this phase available” warning.
Preset	Set to N on a "Restore Input/Output Defaults"
State Saved	Saved in instrument state
Range	Phase N|Phase L1|Phase L2|Phase L3 Only one phase can be selected.
Initial S/W Revision	A.14.50

150 kHz Highpass (Remote Command Only)

Controls highpass setting on the V-network.

Remote Command	`INPut[1]|2:LISN:FILTer:HPAS[:STATe] ON|OFF` `INPut[1]|2:LISN:FILTer:HPAS[:STATe]?`
Example	:INP:LISN:FILT:HPAS ON
Dependencies	Only available for ENV216 V-network . This key is grayed out when a V-network that is not ENV216 is selected. If the grayed out key is pressed, an advisory message is generated. If the equivalent SCPI command is sent, this same message is generated as part of a “–221, Settings conflicts; LISN function not available” warning.
Preset	Set to off on a "Restore Input/Output Defaults"
State Saved	Saved in instrument state
Range	ON|OFF
Initial S/W Revision	A.14.50

Protective Earth (Remote Command Only)

Enables you to set the Protective Earth setting that is controlled via the AUX IO port.

Remote Command	`INPut[1]|2:LISN:PEARth GROunded|FLOating` `INPut[1]|2:LISN:PEARth?`
Example	:INP:LISN:PEAR GRO

Dependencies	Only available for ESH2Z5. This key is grayed out when a v-network other than ESH2Z5 is selected. If the grayed out key is pressed, an advisory message is generated. If the equivalent SCPI command is sent, this same message is generated as part of a “–221, Settings conflict; LISN function not available” warning.
Preset	Set to GRO on a "Restore Input/Output Defaults"
State Saved	Saved in instrument state
Range	GRO|FLO
Initial S/W Revision	A.14.50

5 Mode Functions

Mode

The Mode key allows you to select the available measurement applications or “Modes”. Modes are a collection of measurement capabilities packaged together to provide an instrument personality that is specific to your measurement needs. Each application software product is ordered separately by Model Number and must be licensed to be available. Once an instrument mode is selected, only the commands that are valid for that mode can be executed.

NOTE Key operation can be different between modes. The information displayed in Help is about the current mode.

To access Help for a different Mode you must first exit Help (by pressing the Cancel (Esc) key). Then select the desired mode and re-access Help.

For more information on Modes, preloading Modes, and memory requirements for Modes,

see "More Information" on page 153

Key Path	Front-panel key
Remote Command	`:INSTrument[:SELect] SA | RTSA | SEQAN | EMI | BASIC | WCDMA | EDGEGSM | WIMAXOFDMA | VSA | PNOISE | NFIGure | ADEMOD | BTooth | TDSCDMA | CDMA2K | CDMA1XEV | LTE | LTETDD | LTEAFDD | LTEATDD | MSR | DVB | DTMB | DCATV | ISDBT | CMMB | WLAN | CWLAN | CWIMAXOFDM | WIMAXFIXED | IDEN | RLC | SCPILC | VSA89601` `:INSTrument[:SELect]?`
Example	:INST SA
Notes	The available parameters are dependent upon installed and licensed applications resident in the instrument. Parameters given here are an example, specific parameters are in the individual Application. A list of the valid mode choices is returned with the INST:CAT? Query.
Preset	This is unaffected by a Preset but is set on a “Restore System Defaults->All” to: SEQAN
State Saved	Saved in instrument state
Backwards Compatibility SCPI	`:INSTrument[:SELect] GSM` provided forbackwards compatibility. Mapped to EDGEGSM.

Backwards Compatibility SCPI	`:INSTrument[:SELect] SANalyzer`
	provided for ESU compatibility. When this command is received, the analyzer aliases it to the following:
	`INST:SEL SCPILC`
	This results in the analyzer being placed in SCPI Language Compatibility Mode, in order to emulate the ESU Spectrum Analyzer Mode.

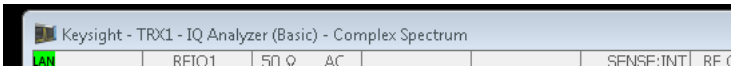
Backwards Compatibility SCPI	`:INSTrument[:SELect] RECeiver`
	provided for ESU compatibility. When this command is received, the analyzer aliases it to the following:
	`:INST:SEL EMI`

	`:CONF FSC` This results in the analyzer being placed in the EMI Receiver Mode, running the Frequency Scan measurement, in order to emulate the ESU Receiver Mode.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.13.00

Example	:INST 'SA'
Notes	The query is not a quoted string. It is an enumeration as indicated in the Instrument Select table above. The command must be sequential: i.e. continued parsing of commands cannot proceed until the instrument select is complete and the resultant SCPI trees are available.
Backwards Compatibility SCPI	`:INSTrument[:SELect] 'SA'|'PNOISE'|'EDGE'|'GSM'|'BASIC'`
Initial S/W Revision	Prior to A.02.00

More Information

The Mode name appears on the banner after the word "Keysight" followed by the Measurement Title. For example, for the IQ Analyzer mode with the Complex Spectrum measurement running:



It is possible to specify the order in which the Modes appear in the Mode menu, using the Configure Applications utility (System, Power On, Configure Applications). It is also possible, using the same utility, to specify a subset of the available applications to load into memory at startup time, which can significantly decrease the startup time of the analyzer. During runtime, if an application that is not loaded into memory is selected (by either pressing that applications Mode key or sending that applications :INST:SEL command over SCPI), there will be a pause while the Application is loaded. During this pause a message box that says "Loading application, please wait..." is displayed.

Each application (Mode) that runs in the X-Series signal analyzers consumes virtual memory. The various applications consume varying amounts of virtual memory, and as more applications run, the memory consumption increases. Once an application is run, some of its memory remains allocated even when it is not running, and is not released until the analyzer program (xSA.exe) is shut down.

Keysight characterizes each Mode and assigns a memory usage quantity based on a conservative estimate. There is a limited amount of virtual memory available to applications (note that this is virtual memory and is independent of how much physical RAM is in the instrument). The instrument keeps track of how much memory is being used by all loaded applications – which includes those that preloaded at startup, and all of those that have been run since startup.

When you request a Mode that is not currently loaded, the instrument looks up the memory estimate for that Mode, and adds it to the residual total for all currently loaded Modes. If there is not enough virtual memory to load the Mode, a dialog box and menu will appear that gives you four options:

1. Close and restart the analyzer program without changing your configured preloads. This may free up enough memory to load the requested Mode, depending on your configured preloads

2. Clear out all preloads and close and restart the analyzer program with only the requested application preloaded, and with that application running. This choice is guaranteed to allow you to run the requested application; but you will lose your previously configured preloads. In addition, there may be little or no room for other applications, depending on the size of the requested application.

3. Bring up the Configure Applications utility in order to reconfigure the preloaded apps to make room for the applications you want to run (this will then require restarting the analyzer program with your new configuration). This is the recommended choice because it gives you full flexibility to select exactly what you want.

4. Exit the dialog box without doing anything, which means you will be unable to load the application you requested.

In each case except 4, this will cause the analyzer software to close, and you will lose all unsaved traces and results.

If you attempt to load a mode via SCPI that will exceed memory capacity, the Mode does not load and an error message is returned:

–225,"Out of memory;Insufficient resources to load Mode (mode name)"

where “mode name” is the SCPI parameter for the Mode in question, for example, SA for Spectrum Analyzer Mode.

Sequence Analyzer

Selects the Sequence Analyzer mode for sequenced measurements. Depending on licensed applications there may be a number of different measurements available in this mode. These measurements are all done on IQ captured data and can be set up to calculated on any part of the capture.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL SEQAN INST:NSEL 400
Initial S/W Revision	A.05.01

IQ Analyzer (Basic)

The IQ Analyzer Mode makes general purpose frequency domain and time domain measurements. These measurements often use alternate hardware signal paths when compared with a similar measurement in the Signal Analysis Mode using the Swept SA measurement. These frequency domain and time domain measurements can be used to output I/Q data results when measuring complex modulated digital signals.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL BASIC INST:NSEL 8
Initial S/W Revision	Prior to A.02.00

W-CDMA with HSPA+

Selects the W-CDMA with HSPA+ mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL WCDMA INST:NSEL 9
Initial S/W Revision	Prior to A.02.00

GSM/EDGE/EDGE Evo

Selects the GSM with EDGE mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL EDGEGSM INST:NSEL 13
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Analog Demod

Selects the Analog Demod mode for making measurements of AM, FM and phase modulated signals.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL ADEMOD INST:NSEL 234
Initial S/W Revision	Prior to A.02.00

Bluetooth

Selects the Bluetooth mode for Bluetooth specific measurements. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL BT INST:NSEL 228
Initial S/W Revision	A.06.01

TD-SCDMA with HSPA/8PSK

Selects the TD-SCDMA mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL TDSCDMA INST:NSEL 211
Initial S/W Revision	Prior to A.02.00

cdma2000

Selects the cdma2000 mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL CDMA2K INST:NSEL 10
Initial S/W Revision	Prior to A.02.00

1xEV-DO

Selects the 1xEV-DO mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL CDMA1XEV INST:NSEL 15
Initial S/W Revision	Prior to A.02.00

WLAN

Selects the WLAN mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL WLAN INST:NSEL 217
Initial S/W Revision	A.09.491

LTE-Advanced FDD

As LTE-Advanced FDD and LTE modes are converged into one single application, the single softkey under Mode menu is designed to select the coverged mode. The display mode of the LTE and LTE-Advanced FDD are distinguished by the licenses.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL LTEAFDD INST:NSEL 107
Notes	When the N9080A/80B-1FP exists, the display mode name is LTE. When the N9080A/80B-1FP and N9080B-2FP all exist, the display mode name is LTE FDD & LTE-A FDD.
Backwards Compatibility SCPI	`INST:SEL LTE` `INST:NSEL 102`
Initial S/W Revision	A.14.00
Modified at S/W Revision	A.14.50

LTE-Advanced TDD

As LTE-Advanced TDD and LTE TDD modes are converged into one single application, the single softkey under Mode menu is designed to select the coverged mode. The display mode of the LTE TDD and LTE-Advanced TDD are distinguished by the licenses.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL LTEATDD INST:NSEL 108
Notes	When the N9082A/82B-1FP exists, the display mode name is LTE TDD. When the N9082A/82B-1FP and N9082B-2FP all exist, the display mode name is LTE TDD & LTE-A TDD.
Backwards Compatibility SCPI	`INST:SEL LTETDD` `INST:NSEL 105`
Initial S/W Revision	A.14.00
Modified at S/W Revision	A.14.50

802.16 OFDMA (WiMAX/WiBro)

Selects the OFDMA mode for general purpose measurements of WiMAX signals. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL WIMAXOFDMA INST:NSEL 75
Initial S/W Revision	Prior to A.02.00

Application Mode Number Selection (Remote Command Only)

Select the measurement mode by its mode number. The actual available choices depend upon which applications are installed in your instrument. The modes appear in this table in the same order they appear in the Mode menu (if the order is not changed by the Configure Applications utility found in the System, Power On menu). See "Detailed List of Modes" on page 163 for Mode details.

The Mode Number is the parameter for use with the :INSTrument:NSELect command. The Mode Parameter is the parameter for use with the :INSTrument[:SELect] command.

Mode	Mode Number	Mode Parameter

Sequence Analyzer	400	SEQAN
I/Q Analyzer (Basic)	8	BASIC
WCDMA with HSPA+	9	WCDMA
GSM/EDGE/EDGE Evo	13	EDGEGSM
Analog Demod	234	ADEMOD
Bluetooth	228	BTooth
TD-SCDMA with HSPA/8PSK	211	TDSCDMA
cdma2000	10	CDMA2K
1xEV-DO	15	CDMA1XEV
LTE	102	LTE
LTE TDD	105	LTETDD
LTE-Advanced FDD	107	LTEAFDD
LTE-Advanced TDD	108	LTEATDD
WLAN	217	WLAN
802.16 OFDM (Fixed WiMAX)	104	WIMAXFIXED

Remote Command	`:INSTrument:NSELect <integer>` `:INSTrument:NSELect?`
Example	:INST:NSEL 1
Notes	SA mode is 1 The command must be sequential: i.e. continued parsing of commands cannot proceed until the instrument select is complete and the resultant SCPI trees are available.
Preset	Not affected by Preset. Set to default mode (1 for SA mode) following Restore System Defaults.
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

Application Mode Catalog Query (Remote Command Only)

Returns a string containing a comma separated list of names of all the installed and licensed measurement modes (applications). These names can only be used with the :INSTrument[:SELect] command.

Remote Command	`:INSTrument:CATalog?`
Example	:INST:CAT?
Notes	Query returns a quoted string of the installed and licensed modes separated with a comma. Example: "SA,PNOISE,WCDMA"

Backwards Compatibility Notes	VSA (E4406A) :INSTrument:CATalog? returned a list of installed INSTrument:SELECT items as a comma separated list of string values: "BASIC","GSM","EDGEGSM","CDMA","NADC","PDC","WCDMA","CDMA2K","CDMA1XEV","IDEN","WIDEN","WLAN","SERVICE" X-Series uses the ESA/PSA compatible query of a string contain comma separated values: "SA,PNOISE,NFIGURE,BASIC,CDMA,CDMA2K,WCDMA,CDMA1XEV,EDGEGSM,GSM,NADC,PDC,TDSCDMA,DMODULATION,WLAN"
Initial S/W Revision	Prior to A.02.00

Application Identification (Remote Commands Only)

Each entry in the Mode Menu will have a Model Number and associated information: Version, and Options.

This information is displayed in the Show System screen. The corresponding SCPI remote commands are defined here.

"Current Application Model " on page 160

"Current Application Revision" on page 160

"Current Application Options" on page 161

Current Application Model

Returns a string that is the Model Number of the currently selected application (mode).

Remote Command	`:SYSTem:APPLication[:CURRent][:NAME]?`
Example	:SYST:APPL?
Notes	Query returns a quoted string that is the Model Number of the currently selected application (Mode). Example: "N9060A" String length is 6 characters.
Preset	Not affected by Preset
State Saved	Not saved in state, the value will be the selected application when a Save is done.
Initial S/W Revision	Prior to A.02.00

Current Application Revision

Returns a string that is the Revision of the currently selected application (mode).

Remote Command	`:SYSTem:APPLication[:CURRent]:REVision?`
Example	:SYST:APPL:REV?
Notes	Query returns a quoted string that is the Revision of the currently selected application (Mode). Example:

	"1.0.0.0" String length is a maximum of 23 characters. (each numeral can be an integer + 3 decimal points)
Preset	Not affected by a Preset
State Saved	Not saved in state, the value will be the selected application when a Save is done.
Initial S/W Revision	Prior to A.02.00

Current Application Options

Returns a string that is the Options list of the currently selected application (Mode).

Remote Command	`:SYSTem:APPLication[:CURRent]:OPTion?`
Example	:SYST:APPL:OPT?
Notes	Query returns a quoted string that is the Option list of the currently selected application (Mode). The format is the name as the *OPT? or SYSTem:OPTion command: a comma separated list of option identifiers. Example: "1FP,2FP" String length is a maximum of 255 characters.
Preset	Not affected by a Preset
State Saved	Not saved in state per se, the value will be the selected application when a Save is invoked.
Initial S/W Revision	Prior to A.02.00

Application Identification Catalog (Remote Commands Only)

A catalog of the installed and licensed applications (Modes) can be queried for their identification.

"Application Catalog Number of Entries" on page 161

"Application Catalog Model Numbers" on page 162

"Application Catalog Revision" on page 162

"Application Catalog Options" on page 162

Application Catalog Number of Entries

Returns the number of installed and licensed applications (Modes).

Remote Command	`:SYSTem:APPLication:CATalog[:NAME]:COUNt?`
Example	:SYST:APPL:CAT:COUN?
Preset	Not affected by Preset
State Saved	Not saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Application Catalog Model Numbers

Returns a list of Model Numbers for the installed and licensed applications (Modes).

Remote Command	`:SYSTem:APPLication:CATalog[:NAME]?`
Example	:SYST:APPL:CAT?
Notes	Returned value is a quoted string of a comma separated list of Model Numbers. Example, if SAMS and Phase Noise are installed and licensed: "N9060A,N9068A" String length is COUNt * 7 – 1. (7 = Model Number length + 1 for comma. –1 = no comma for the 1st entry.)
Preset	Not affected by a Preset
State Saved	Not saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Application Catalog Revision

Returns the Revision of the provided Model Number.

Remote Command	`:SYSTem:APPLication:CATalog:REVision? <model>`
Example	:SYST:APPL:CAT:REV? 'N9060A'
Notes	Returned value is a quoted string of revision for the provided Model Number. The revision will be a null-string ("") if the provided Model Number is not installed and licensed. Example, if SAMS is installed and licensed: "1.0.0.0"
Preset	Not affected by a Preset.
State Saved	Not saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Application Catalog Options

Returns a list of Options for the provided Model Number

Remote Command	`:SYSTem:APPLication:CATalog:OPTion? <model>`
Example	:SYST:APPL:CAT:OPT? 'N9060A'
Notes	Returned value is a quoted string of a comma separated list of Options, in the same format as *OPT? or :SYSTem:OPTion?. If the provided Model Number is not installed and licensed a null-string ("") will be returned. Example, if SAMS is installed and licensed: "2FP" String length is a maximum of 255 characters.
Preset	Not affected by a Preset

State Saved	Not saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Detailed List of Modes

This section contains an alphabetical list of Modes available in the X-Series, along with a brief description of each Mode.

Note that with the exception of the 89601 VSA, only licensed applications appear in the Mode menu. The 89601 will always appear, because it's licensing is handled differently.

1xEV-DO

Selects the 1xEV-DO mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL CDMA1XEV INST:NSEL 15
Initial S/W Revision	Prior to A.02.00

802.16 OFDMA (WiMAX/WiBro)

Selects the OFDMA mode for general purpose measurements of WiMAX signals. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL WIMAXOFDMA INST:NSEL 75
Initial S/W Revision	Prior to A.02.00

89601 VSA

Selecting the 89601 VSA mode will start the 89600 VSA software. The 89600 VSA software is powerful, PC-based software, offering the industry's most sophisticated general purpose and standards specific signal evaluation and troubleshooting tools for R&D engineers. Even for proprietary and non-standard signals in SATCOM or MILCOM applications, you can make signal quality measurements with customized IQ constellation. Reach deeper into signals, gather more data on signal problems, and gain greater insight.

- Over 35 general-purpose analog and digital demodulators ranging from 2FSK to 4096QAM
- Flexible and custom IQ and OFDM signal analysis for single carrier
- Standards specific modulation analysis including:
  - –Cellular: GSM/EDGE, cdma2000, W-CDMA, TD-SCDMA, LTE(FDD/TDD),
  - –LTE-Advanced and more
  - –Wireless networking: 802.11a/b/g, 802.11n, 802.ac, 802.16 WiMAX (fixed/mobile), WiSUN (MR-FSK PHY)
  - –RFID
  - –Digital satellite video and other satellite signals, radar, LMDS
  - –Up to 400K bin FFT, for the highest resolution spectrum analysis
  - –A full suite of time domain analysis tools, including signal capture and playback, time gating, and CCDF measurements
  - –20 simultaneous trace displays and the industry's most complete set of marker functions
  - –Easy-to-use Microsoft ® Windows ® graphical user interface

For more information see the Agilent 89600 Series VSA web site at www.agilent.com/find/89600vsa

To learn more about how to use the 89600 VSA running in the X-Series, after the 89600 VSA software is running, open the 89600 VSA Help and open the "About Agilent X-Series Signal Analyzer with 89600 VSA Software" help topic.

Key Path	Mode
Example	INST:SEL VSA89601 INST:NSEL 101
Initial S/W Revision	Prior to A.02.00

Analog Demod

Selects the Analog Demod mode for making measurements of AM, FM and phase modulated signals.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL ADEMOD INST:NSEL 234
Initial S/W Revision	Prior to A.02.00

Bluetooth

Selects the Bluetooth mode for Bluetooth specific measurements. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL BT INST:NSEL 228
Initial S/W Revision	A.06.01

cdma2000

Selects the cdma2000 mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL CDMA2K INST:NSEL 10
Initial S/W Revision	Prior to A.02.00

GSM/EDGE/EDGE Evo

Selects the GSM with EDGE mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL EDGEGSM INST:NSEL 13
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

IQ Analyzer (Basic)

The IQ Analyzer Mode makes general purpose frequency domain and time domain measurements. These measurements often use alternate hardware signal paths when compared with a similar measurement in

the Signal Analysis Mode using the Swept SA measurement. These frequency domain and time domain measurements can be used to output I/Q data results when measuring complex modulated digital signals.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL BASIC INST:NSEL 8
Initial S/W Revision	Prior to A.02.00

LTE

Selects the LTE mode for general purpose measurements of signals following the LTE FDD standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL LTE INST:NSEL 102
Initial S/W Revision	Prior to A.02.00

LTE TDD

Selects the LTE TDD mode for general purpose measurements of signals following the LTE TDD standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL LTETDD INST:NSEL 105
Initial S/W Revision	A.03.00

LTE-Advanced FDD

As LTE-Advanced FDD and LTE modes are converged into one single application, the single softkey under Mode menu is designed to select the coverged mode. The display mode of the LTE and LTE-Advanced FDD are distinguished by the licenses.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL LTEAFDD INST:NSEL 107
Notes	When the N9080A/80B-1FP exists, the display mode name is LTE. When the N9080A/80B-1FP and N9080B-2FP all exist, the display mode name is LTE FDD & LTE-A FDD.
Backwards Compatibility SCPI	`INST:SEL LTE` `INST:NSEL 102`
Initial S/W Revision	A.14.00
Modified at S/W Revision	A.14.50

LTE-Advanced TDD

As LTE-Advanced TDD and LTE TDD modes are converged into one single application, the single softkey under Mode menu is designed to select the coverged mode. The display mode of the LTE TDD and LTE-Advanced TDD are distinguished by the licenses.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL LTEATDD INST:NSEL 108
Notes	When the N9082A/82B-1FP exists, the display mode name is LTE TDD. When the N9082A/82B-1FP and N9082B-2FP all exist, the display mode name is LTE TDD & LTE-A TDD.
Backwards Compatibility SCPI	`INST:SEL LTETDD` `INST:NSEL 105`
Initial S/W Revision	A.14.00
Modified at S/W Revision	A.14.50

Sequence Analyzer

Selects the Sequence Analyzer mode for sequenced measurements. Depending on licensed applications there may be a number of different measurements available in this mode. These measurements are all done on IQ captured data and can be set up to calculated on any part of the capture.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL SEQAN

	INST:NSEL 400
Initial S/W Revision	A.05.01

TD-SCDMA with HSPA/8PSK

Selects the TD-SCDMA mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL TDSCDMA INST:NSEL 211
Initial S/W Revision	Prior to A.02.00

Vector Signal Analyzer (VXA)

The N9064A (formerly 89601X) VXA Vector signal and WLAN modulation analysis application provides solutions for basic vector signal analysis, analog demodulation, and digital demodulation. The digital demodulation portion of N9064A allows you to perform measurements on standard-based formats such as cellular, wireless networking and digital video as well as general purpose flexible modulation analysis for wide range of digital formats, FSK to 1024QAM, with easy-to-use measurements and display tools such as constellation and eye diagram, EVM traces and up to four simultaneous displays. Analog baseband analysis is available using the MXA and PXA with option BBA. Option 3FP WLAN has been discontinued.

N9064A honors existing 89601X licenses with all features and functionalities found on X-Series software versions prior to A.06.00. Specifically:

N9064A–1 is equivalent to 89601X–205

N9064A–2 is equivalent to 89601X-AYA

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL VSA INST:NSEL 100
Initial S/W Revision	Prior to A.02.00

W-CDMA with HSPA+

Selects the W-CDMA with HSPA+ mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL WCDMA INST:NSEL 9
Initial S/W Revision	Prior to A.02.00

WLAN

Selects the WLAN mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL WLAN INST:NSEL 217
Initial S/W Revision	A.09.491

Global Settings

Opens a menu that allows you to switch certain Meas Global parameters to a Mode Global state. These switches apply to all Modes that support global settings. No matter what Mode you are in when you set the “Global Center Frequency” switch to on, it applies to all Modes that support Global Settings.

Key Path	Mode Setup
Initial S/W Revision	Prior to A.02.00

Global Center Freq

The software maintains a Mode Global value called “Global Center Freq”.

When the Global Center Freq key is switched to On in any mode, the current mode’s center frequency is copied into the Global Center Frequency, and from then on all modes that support global settings use the Global Center Frequency. So you can switch between any of these modes and the Center Freq will remain unchanged.

Adjusting the Center Freq of any mode which supports Global Settings, while Global Center Freq is On, will modify the Global Center Frequency.

When Global Center Freq is turned Off, the Center Freq of the current mode is unchanged, but now the Center Freq of each mode is once again independent.

When Mode Preset is pressed while Global Center Freq is On, the Global Center Freq is preset to the preset Center Freq of the current mode.

This function is reset to Off when the Restore Defaults key is pressed in the Global Settings menu, or when System, Restore Defaults, All Modes is pressed.

Key Path	Mode Setup, Global Settings
Scope	Mode Global
Remote Command	`:INSTrument:COUPle:FREQuency:CENTer ALL|NONE` `:INSTrument:COUPle:FREQuency:CENTer?`
Example	INST:COUP:FREQ:CENT ALL INST:COUP:FREQ:CENT?
Preset	Set to Off on Global Settings, Restore Defaults and System, Restore Defaults, All Modes
Range	On|Off
Initial S/W Revision	Prior to A.02.00

Remote Command	`:GLOBal:FREQuency:CENTer[:STATe] 1|0|ON|OFF` `:GLOBal:FREQuency:CENTer[:STATe]?`
Preset	Off
Initial S/W Revision	Prior to A.02.00

Restore Defaults

This key resets all of the functions in the Global Settings menu to Off. This also occurs when System, Restore Defaults, All Modes is pressed.

Key Path	Mode Setup, Global Settings
Remote Command	`:INSTrument:COUPle:DEFault`
Example	INST:COUP:DEF
Backwards Compatibility SCPI	`:GLOBal:DEFault`
Initial S/W Revision	Prior to A.02.00

Mode Setup

This key accesses a menu allowing you to set various paramagnets for all VSA measurements.

Key Path	Front Panel
Mode	VSA
Initial S/W Revision	A.01060 or later

Spectrum

This function determines if the spectrum of the incoming data is mirrored or not. The actual mirroring is accomplished by conjugating the complex time data.

Key Path	Mode
Mode	VSA
Remote Command	`[:SENSe]:SPECtrum NORMal|INVert` `[:SENSe]:SPECtrum?`
Example	SPEC INV SPEC?
Preset	NORM
State Saved	Saved in instrument state.
Range	Normal | Invert
Initial S/W Revision	A.01060 or later

Fixed Equalization

Fixed Equalization allows you to apply a fixed FIR equalization filter to the time data, before it is used in further analysis. You define the filter by its frequency response rather than by its impulse response. The frequency response must be stored in a data register.

Key Path	Mode Setup
Mode	VSA
Initial S/W Revision	A.01060 or later

Fixed EQ Mode

This allows you to turn fixed equalization off, on in normal mode, or on in inverted mode. The effect of Normal mode is to divide the spectrum of the unequalized data by the frequency response in the data register. Invert mode multiplies instead of dividing.

Key Path	Meas Setup, Fixed Equalization
Mode	VSA
Remote Command	`[:SENSe]:CORRection:FEQualizer OFF|NORMal|INVert` `[:SENSe]:CORRection:FEQualizer?`
Example	CORR:FEQ NORM CORR:FEQ?
Preset	OFF
State Saved	Saved in instrument state.
Range	Off | Normal | Invert
Initial S/W Revision	A.01060 or later

Freq Response Register

This allows you to choose a register that contains the frequency response information for fixed equalization.

Key Path	Meas Setup, Fixed Equalization
Mode	VSA
Remote Command	`[:SENSe]:CORRection:FEQualizer:REGister D1|D2|D3|D4|D5|D6` `[:SENSe]:CORRection:FEQualizer:REGister?`
Example	CORR:FEQ:REG D2 CORR:FEQ:REG?
Preset	D1
State Saved	Saved in instrument state.
Range	Data 1| Data 2| Data 3| Data 4| Data 5| Data 6
Initial S/W Revision	A.01060 or later

Fixed Equalization Mapping

This read-only SCPI function allows you to determine if fixed equalization is applied using relative or absolute frequency mapping between the current measurement span and the span of the frequency response data in the chosen register.

If possible, the equalizer response is defined using the portion of the register data that falls within the current measurement span. For example, if the data register covers frequencies from 200 MHz to 236 MHz, and the measurement span is 6 MHz wide centered at 210 MHz, then the register data from 207 MHz to 213 MHz is used to define the equalizer response. This is an example of absolute frequency mapping.

If the same register data is used but measurement center frequency is then changed to 70 MHz, then relative frequency mapping must be used. The center frequency of the register data is mapped to the

measurement center frequency, and an equivalent span of data is taken. In this example, register data from 215 MHz to 221 MHz is used as though it covered a frequency span of 67 MHz to 73 MHz.

Relative frequency mapping is used if some or all of the measurement span falls outside the data register's frequency span. It can be desirable when measuring across frequency converters, but can be surprising otherwise. Be careful to use a measurement span that is equal to or narrower than the span of the data register.

Mode	VSA
Remote Command	`[:SENSe]:CORRection:FEQualizer:RELative?`
Example	CORR:FEQ:REL?
Notes	Returns 1 if fixed equalizer frequency mapping is relative; 0 otherwise.
Initial S/W Revision	A.01060 or later

6 System Functions

File

Opens a menu that enables you to access various standard and custom Windows functions. Press any other front-panel key to exit

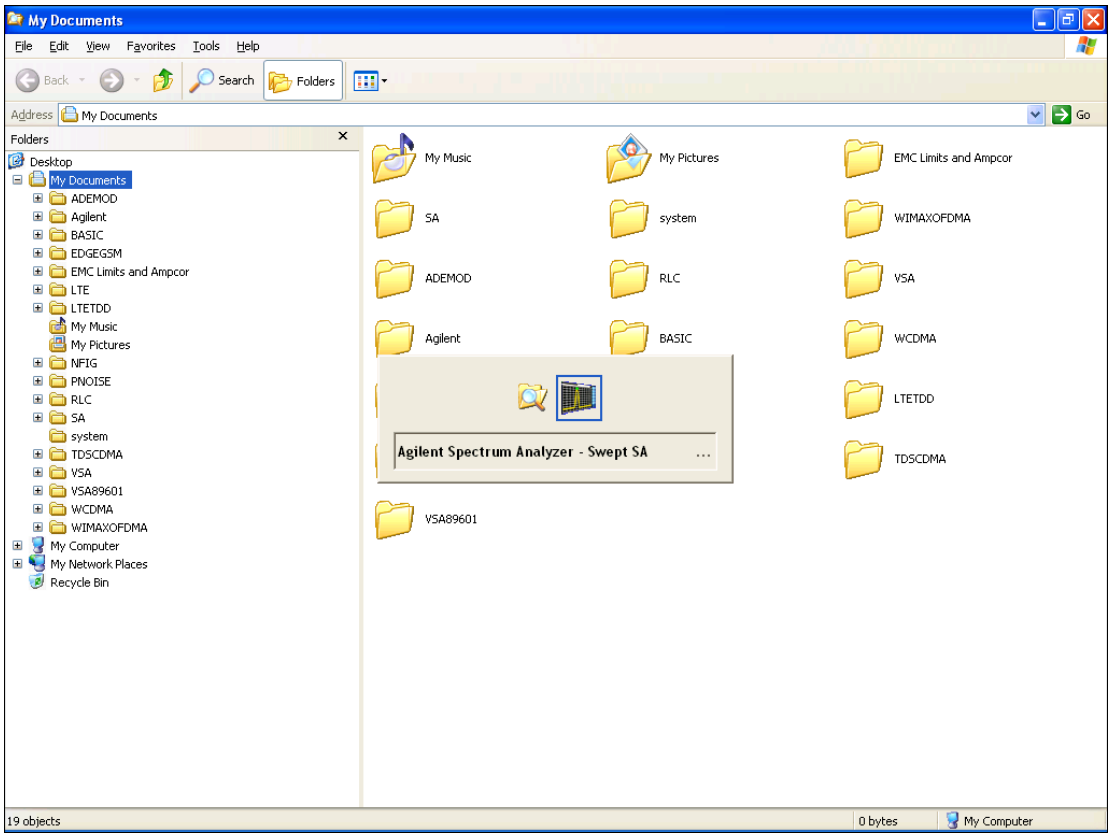
Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

File Explorer

Opens the standard Windows File Explorer. The File Explorer opensin the My Documents directory for the current user.

The File Explorer is a separate Windows application, so to return to the analyzer once you are in the File Explorer, you may either:

Exit the File Explorer by clicking on the red X in the upper right corner, with a mouse



Or use Alt-Tab: press and hold the Alt

key and press and release the Tab key until the Analyzer logo is showing in the window in the center of the screen, as shown above, then release the Alt key.

The ability to access File Explorer is not available if Option SF1 is installed.

Key Path	File
Initial S/W Revision	Prior to A.02.00

Print

The Print key opens a Print dialog for configured printing (for example, to the printer of your choice). Refer to your Microsoft Windows Operating System manual for more information.

Maximize/Restore Down

These keys allow the Instrument Application to be maximized and then restored to its prior state. Only one of the two keys is visible at a time. When not already maximized the Maximize Application key is visible, and when maximized, the Restore Down Application key is visible and replaces the Maximize Application key.

Maximize

This key allows you to Maximize the Instrument Application, which causes the analyzer display to fill the screen. Once the application is maximized, this key is replaced by the Restore Down key.

Key Path	File
Mode	All
Notes	No equivalent remote command for this key.
State Saved	No
Initial S/W Revision	A.05.01

Restore Down

This key allows you to Restore Down the Instrument Application and reverses the action taken by Maximize. This key is only visible when the application has been maximized, and after the Restore Down action has been completed this key is replaced by the Maximize key.

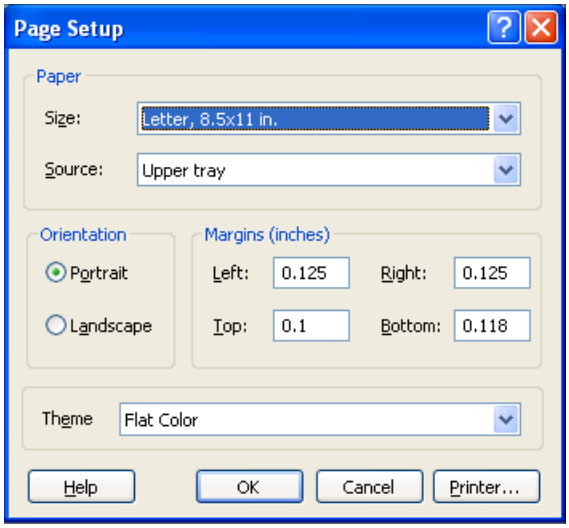
Key Path	File
Mode	All
Notes	No equivalent remote command for this key.
State Saved	No
Initial S/W Revision	A.05.01

Page Setup

The Page Setup key brings up a Windows Page Setup dialog that allows you to control aspects of the pages sent to the printer when the PRINT hardkey is pressed.

Key Path	File
Initial S/W Revision	Prior to A.02.00

Paper size, the printer paper source, the page orientation and the margins are all settable. Just like any standard Windows dialog, you may navigate the dialog using the front-panel keys, or a mouse. There are no SCPI commands for controlling these parameters.



Also contained in this dialog is a drop-down control that lets you select the Theme to use when printing. For more on Themes, see information under View/Display, Display, System Display Settings, Theme. The Theme control has a corresponding SCPI command.

Parameter Name	Print Themes
Parameter Type	Enum
Mode	All
Remote Command	`:SYSTem:PRINt:THEMe TDColor|TDMonochrome|FCOLor|FMONochrome` `:SYSTem:PRINt:THEMe?`
Example	:SYST:PRIN:THEM FCOL
Setup	:SYSTem:DEFault MISC
Preset	FCOL; not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Print

This front-panel key is equivalent to performing a File, Print, OK. It immediately performs the currently configured Print to the Default printer.

The :HCOPy command is equivalent to pressing the PRINT key. The HCOPy:ABORt command can be used to abort a print which is already in progress. Sending HCOPy:ABORt will cause the analyzer to stop sending data to the printer, although the printer may continue or even complete the print, depending on how much data was sent to the printer before the user sent the ABORt command.

Key Path	Front-panel key
Remote Command	`:HCOPy[:IMMediate]`
Initial S/W Revision	Prior to A.02.00

Key Path	SCPI command only
Remote Command	`:HCOPy:ABORt`
Initial S/W Revision	Prior to A.02.00

Restore Down

This key allows you to Restore Down the Instrument Application and reverses the action taken by Maximize. This key is only visible when the application has been maximized, and after the Restore Down action has been completed this key is replaced by the Maximize key.

Key Path	File
Mode	All
Notes	No equivalent remote command for this key.
State Saved	No
Initial S/W Revision	A.05.01

Minimize

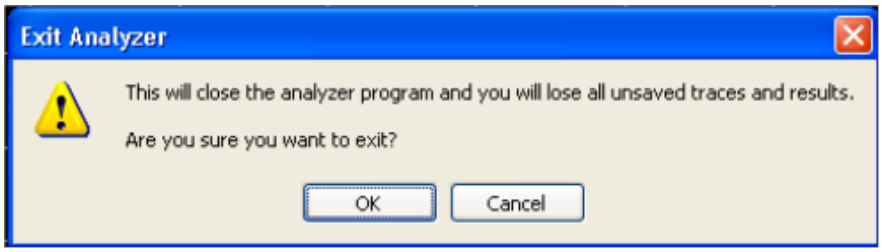
The Minimize key causes the analyzer display to disappear down into the task bar, allowing you to see the Windows Desktop. You can use Alt-Tab (press and hold the Alt

key and press and release the Tab key) to restore the analyzer display.

Key Path	File
Mode	All
Notes	No equivalent remote command for this key.
State Saved	No
Initial S/W Revision	A.05.01

Exit

This key, when pressed, will exit the Instrument Application. A dialog box is used to confirm that you intended to exit the application:



Key Path	File
Mode	All
Notes	The Instrument Application willclose. No further SCPI commands can be sent. Use with caution!
Initial S/W Revision	Prior to A.02.00

Print

This front-panel key is equivalent to performing a File, Print, OK. It immediately performs the currently configured Print to the Default printer.

The :HCOPy command is equivalent to pressing the PRINT key. The HCOPy:ABORt command can be used to abort a print which is already in progress. Sending HCOPy:ABORt will cause the analyzer to stop sending data to the printer, although the printer may continue or even complete the print, depending on how much data was sent to the printer before the user sent the ABORt command.

Key Path	Front-panel key
Remote Command	`:HCOPy[:IMMediate]`
Initial S/W Revision	Prior to A.02.00

Key Path	SCPI command only
Remote Command	`:HCOPy:ABORt`
Initial S/W Revision	Prior to A.02.00

System

Opens a menu of keys that access various configuration menus and dialogs.

Key Path	Front-panel key
Notes	No remote command for this key specifically.
Initial S/W Revision	Prior to A.02.00

Show

Accesses a menu of choices that enable you to select the information window you want to view.

Key Path	System
Mode	All
Remote Command	`:SYSTem:SHOW OFF | ERRor | SYSTem | HARDware | LXI | HWSTatistics | ALIGnment | SOFTware | CAPPlication` `:SYSTem:SHOW?`
Example	:SYST:SHOW SYST
Notes	This command displays (or exits) the various System information screens.
Preset	OFF
State Saved	No
Range	OFF| ERRor | SYSTem | HARDware | LXI | HWSTatistics | ALIGNment | SOFTware|CAPPlication
Initial S/W Revision	Prior to A.02.00

Errors

There are two modes for the Errors selection, History and Status.

The list of errors displayed in the Errors screen does not automatically refresh. You must press the Refresh key or leave the screen and return to it to refresh it.

History brings up a screen displaying the event log in chronological order, with the newest event at the top. The history queue can hold up to 100 messages (if a message has a repeat count greater than 1 it only counts once against this number of 100). Note that this count bears no relation to the size of the SCPI queue. If the queue extends onto a second page, a scroll bar appears to allow scrolling with a mouse. Time is displayed to the second.

Status brings up a screen summarizing the status conditions currently in effect. Note that the time is displayed to the second.

The fields on the Errors display are:

Type (unlabeled) - Displays the icon identifying the event or condition as an error or warning.

ID - Displays the error number.

Message - Displays the message text.

Repeat (RPT) - This field shows the number of consecutive instances of the event, uninterrupted by other events. If an event occurs 5 times with no other intervening event, the value of repeat will be 5.

If the value of Repeat is 1 the field does not display. If the value of Repeat is >1, the time and date shown are those of the most recent occurrence. If the value of repeat reaches 999,999 it stops there.

Time - Shows the most recent time (including the date) at which the event occurred.

Key Path	System, Show
Mode	All
Remote Command	`:SYSTem:ERRor[:NEXT]?`
Example	:SYST:ERR?
Notes	The return string has the format: "<Error Number>,<Error>" Where <Error Number> and <Error> are those shown on the Show Errors screen
Backwards Compatibility Notes	In some legacy analyzers, the Repeat field shows the number of times the message has repeated since the last time the error queue was cleared. In the X-Series, the Repeat field shows the number of times the error has repeated since the last intervening error. So the count may very well be different than in the past even for identical signal conditions Unlike previous analyzers, in the X-Series all errors are reported through the Message or Status lines and are logged to the event queue. They never appear as text in the graticule area (as they sometimes do in previous analyzers) and they are never displayed in the settings panel at the top of the screen (as they sometimes do, by changing color, in previous analyzers). As a consequence of the above, the user can only see one status condition (the most recently generated) without looking at the queue. In the past, at least in the Spectrum Analyzer, multiple status conditions might display on the right side of the graticule. In general, there is no backwards compatibility specified or guaranteed between the error numbers in the X-Series and those of earlier products. Error, event, and status processing code in customers' software will probably need to be rewritten to work with X-Series. In the legacy analyzers, some conditions report as errors and others simply turn on status bits. Conditions that report as errors often report over and over as long as the condition exists. In the X-series, all conditions report as start and stop events. Consequently, software that repeatedly queries for a condition error until it stops reporting will have to be rewritten for the X-series.
Initial S/W Revision	Prior to A.02.00

Previous Page

See "Next Page" on page 184.

Key Path	System, Show, Errors
Initial S/W Revision	Prior to A.02.00

Next Page

Next Page and Previous Page menu keys move you between pages of the log, if it fills more than one page. These keys are grayed out in some cases:

- If on the last page of the log, the Next Page key is grayed-out
- If on the first page of the log, the Previous Page key is grayed-out.
- If there is only one page, both keys are grayed out.

Key Path	System, Show, Errors
Initial S/W Revision	Prior to A.02.00

History

The History and Status keys select the Errors view. The Status key has a second line that shows a number in [square brackets]. This is the number of currently open status items.

Key Path	System, Show, Errors
Initial S/W Revision	Prior to A.02.00

Verbose SCPI On/Off

When you turn Verbose SCPI on, additional information is returned when you send the :SYSTem:ERRor? query. The additional information consists of the characters that stimulated the error. This can aid you in debugging your test programs by indicating where in the parsing of a SCPI command the instrument encountered an invalid command or query.

Specifically, with Verbose SCPI on, the SYSTem:ERRor? query is expanded to show the SCPI data received, with the indicator <Err> at the point in the stream that the error occurred.

Verbose SCPI has no effect on the Show Errors screen or front panel Message Line; it only changes the response to the :SYST:ERR? query.

See the example below, where the invalid command “SENS:BOGUS” is sent:

Normal response to :SYST:ERR (using the Telnet window):

SCPI> SENS:BOGUS

SCPI> SYST:ERR?

–113,"Undefined header"

Now after turning on Verbose SCPI:

SCPI> SYST:BOGUS

SCPI> SYST:ERR?

–113,"Undefined header;SYST:BOGUS<Err>"

Key Path	System, Show, Errors
Mode	All
Remote Command	`:SYSTem:ERRor:VERBose OFF|ON|0|1` `:SYSTem:ERRor:VERBose?`
Example	:SYST:ERR:VERB ON
Preset	This is unaffected by Preset but is set to OFF on a “Restore System Defaults->Misc”
State Saved	No
Range	On | Off
Initial S/W Revision	Prior to A.02.00

Refresh

When pressed, refreshes the Show Errors display.

Key Path	System, Show, Errors
Initial S/W Revision	Prior to A.02.00

Clear Error Queue

This clears all errors in all error queues.

Note the following:

- Clear Error Queue does not affect the current status conditions.
- Mode Preset does not clear the error queue.
- Restore System Defaults will clear all error queues.
- *CLS only clears the queue if it is sent remotely and *RST does not affect any error queue.
- Switching modes does not affect any error queues.

Key Path	System, Show, Errors
Initial S/W Revision	Prior to A.02.00

Status

See "History" on page 184.

Input Overload Enable (Remote Command Only)

Input Overload errors are reported using the Input Overload status bit (bit 12 in the Measurement Integrity status register). Input Overloads (for example, ADC Overload errors) can come and go with great frequency, generating many error events (for example, for signals just on the verge of overload), and so are

not put into the SCPI error queue by default. Normally the status bit is the only way for detecting these errors remotely.

It is possible to enable Input Overload reporting to the SCPI queue, by issuing the :SYSTem:ERRor:OVERload ON command. To return to the default state, issue the :SYSTem:ERRor:OVERload OFF command. In either case, Input Overloads always set the status bit.

NOTE For versions of firmware before A.10.01, the Input Overload was only a Warning and so was never available in the SCPI queue, although it did set the status bit. For A.10.01 and later, the Input Overload is an error and can be enabled to the SCPI queue using this command.

Key Path	SCPI only
Remote Command	`:SYSTem:ERRor:OVERload[:STATe] 0|1|OFF|ON`
Example	:SYST:ERR:OVER 1 Enable overload errors
Preset	Set to OFF by Restore Misc Defaults (no Overload errors go to SCPI)
State Saved	Saved in instrument state.
Initial S/W Revision	A.10.01

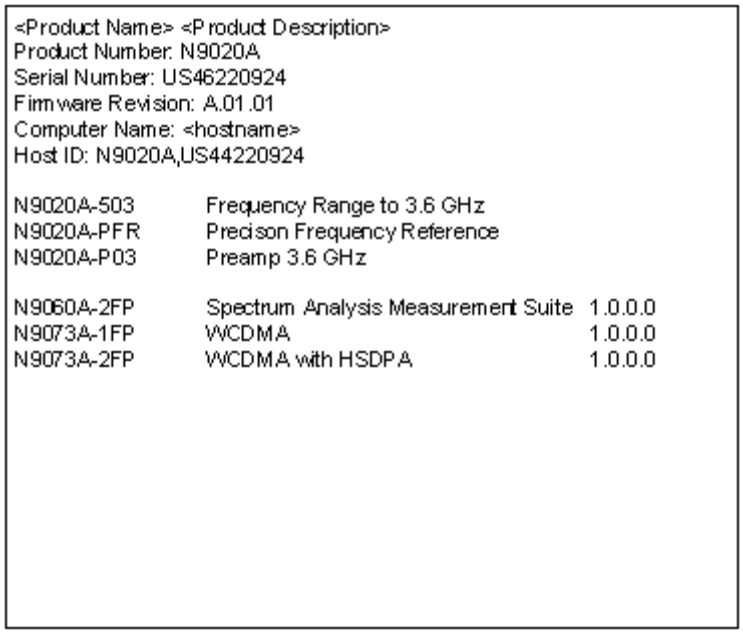
Power Up (Remote Command Only)

This serves to show the errors encountered during the application boot-up, such as: mismatch FW-FPGA, missing Calibration data, missing hardware and construction errors.

Remote Command	`:SYSTem:ERRor:PUP?`
Notes	If no error occurs, the return value will be: “No Power Up Errors.” Return Value: <list of error strings>. <List of error strings> is an <IEEE488 Block> format. Return Value Example: “Power up errors, see details in Windows Event Log” "Unmatched FPGA Version(s), See details in Windows Event Log”
Initial S/W Revision	E.14.30

System

The System screen is formatted into three groupings: product descriptive information, options tied to the hardware, and software products:



The Previous Page is grayed-out if the first page of information is presently displayed. The Next Page menu key is grayed-out if the last page is information is presently displayed.

Key Path	System, Show
Mode	All
Example	SYST:SHOW SYST
Backwards Compatibility Notes	The hardware statistics that are displayed in the PSA Show System screen have been moved to a dedicated Show Hardware Statistics screen in the Service Menu.
Initial S/W Revision	Prior to A.02.00

Show System contents (Remote Command Only)

A remote command is available to obtain the contents of the Show System screen (the entire contents, not just the currently displayed page).

Remote Command	`:SYSTem:CONFigure[:SYSTem]?`
Example	:SYST:CONF?
Notes	The output is an IEEE Block format of the Show System contents. Each line is separated with a new-line character.
Initial S/W Revision	Prior to A.02.00

Computer System description (Remote Command Only)

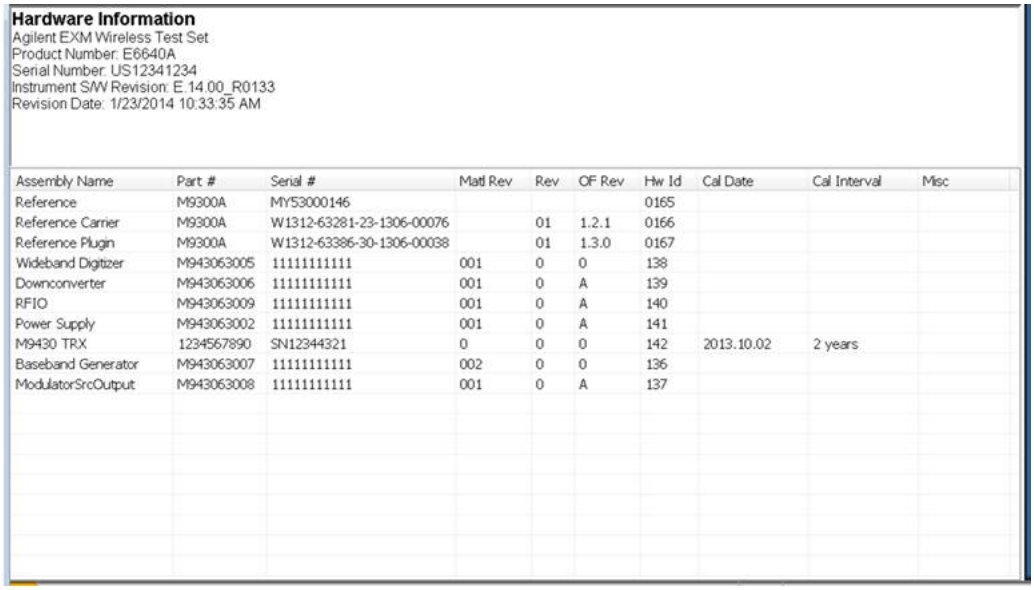
A remote command is available to obtain the Computer System description. The Computer System is the operating system and patch level as reported by operating system.

Remote Command	`:SYSTem:CSYStem?`
Example	:SYST:CSYS?
Notes	The return value is the Computer System name and service pack level.
Initial S/W Revision	Prior to A.12.00

Hardware

The show hardware screen is used to view details of the installed hardware. This information can be used to determine versions of hardware assemblies and field programmable devices, in the advent of future upgrades or potential repair needs.

The screen is formatted into two groupings: product descriptive information and hardware information. The hardware information is listed in a table format:



The Previous Page is grayed-out if the first page of information is presently displayed. The Next Page menu key is grayed-out if the last page is information is presently displayed.

Key Path	System, Show
Mode	All
Example	SYST:SHOW HARD
Initial S/W Revision	Prior to A.02.00

System Remote Commands (Remote Commands Only)

The commands in this section have no front-panel key equivalent.

"System Powerdown (Remote Command Only)" on page 189

"List installed Options (Remote Command Only)" on page 189
"Lock the Front-panel keys (Remote Command Only)" on page 189
"List SCPI Commands (Remote Command Only)" on page 190
"SCPI Version Query (Remote Command Only)" on page 190
"Date (Remote Command Only)" on page 190
"Time (Remote Command Only)" on page 191

Initial S/W Revision	Prior to A.02.00

System Powerdown (Remote Command Only)

Remote Command	`SYSTem:PDOWn [NORMal|FORCe]`
Notes	Shuts down the instrument in the normal way (NORMal) or forced way (FORCe). In case there is another application with modified data pending for saving, the application prompt the user. The system waits until the user responds in the normal mode. It will go off after 20 seconds of wait in the force mode and all data will be lost.

List installed Options (Remote Command Only)

Lists the installed options that pertain to the instrument (signal analyzer). .

Mode	All
Remote Command	`:SYSTem:OPTions?`
Example	:SYST:OPT?
Notes	The return string is a comma separated list of the installed options. For example: "503,P03,PFR" :SYSTem:OPTions? and *OPT? are the same.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Lock the Front-panel keys (Remote Command Only)

Disables the instrument keyboard to prevent local input when the instrument is controlled remotely. Annunciation showing a "K" for 'Klock" (keyboard lock) alerts the local user that the keyboard is locked. Klock is similar to the GPIB Local Lockout function; namely that no front-panel keys are active with the exception of the Power Standby key. (The instrument is allowed to be turned-off if Klock is ON.) The Klock command is used in remote control situations where Local Lockout cannot be used.

Although primary intent of Klock is to lock-out the front panel, it will lock-out externally connected keyboards through USB. Klock has no effect on externally connected pointing devices (mice).

The front panel 'Local' key (Cancel/Esc) has no effect if Klock is ON.

Mode	All
Remote Command	`:SYSTem:KLOCk OFF|ON|0|1` `:SYSTem:KLOCk?`
Example	:SYST:KLOC ON
Notes	Keyboard lock remains in effect until turned-off or the instrument is power-cycled
Preset	Initialized to OFF at startup, unaffected by Preset
State Saved	No
Initial S/W Revision	Prior to A.02.00

List SCPI Commands (Remote Command Only)

Outputs a list of the valid SCPI commands for the currently selected Mode.

Remote Command	`:SYSTem:HELP:HEADers?`
Example	:SYST:HELP:HEAD?
Notes	The output is an IEEE Block format with each command separated with the New-Line character (hex 0x0A)
Initial S/W Revision	Prior to A.02.00

SCPI Version Query (Remote Command Only)

Returns the SCPI version number with which the instrument complies. The SCPI industry standard changes regularly. This command indicates the version used when the instrument SCPI commands were defined.

Remote Command	`:SYSTem:VERSion?`
Example	:SYST:VERS?
Initial S/W Revision	Prior to A.02.00

Date (Remote Command Only)

The recommended access to the Date, Time, and Time zone of the instrument is through the Windows native control (Control Panel or accessing the Task Bar). You may also access this information remotely, as shown in this command and Time (below).

Sets or queries the date in the instrument.

Mode	All
Remote Command	`:SYSTem:DATE "<year>,<month>,<day>"` `:SYSTem:DATE?`

Example	:SYST:DATE “2006,05,26”
Notes	<year> is the four digit representation of year. (for example, 2006) <month> is the two digit representation of year. (for example. 01 to 12) <day> is the two digit representation of day. (for example, 01 to 28, 29, 30, or 31) depending on the month and year Unless the current account has Power User or Administrator privileges, an error will be generated by this command and no action will be taken.
Initial S/W Revision	Prior to A.02.00

Time (Remote Command Only)

Sets or queries the time in the instrument.

Mode	All
Remote Command	`:SYSTem:TIME “<hour>,<minute>,<second>”` `:SYSTem:TIME?`
Example	:SYST:TIME “13,05,26”
Notes	<hour> is the two digit representation of the hour in 24 hour format <minute> is the two digit representation of minute <second> is the two digit representation of second Unless the current account has Power User or Administrator privileges, an error will be generated by this command and no action will be taken.
Initial S/W Revision	Prior to A.02.00

Module Name (Remote Command Only)

Query only. This will return the name of the instance as displayed on the xSA main window.

Mode	All
Remote Command	`:SYSTem:MODule:NAME?`
Example	:SYST:MOD:NAME?
Notes	If the first instance displays on the xSA main window, the return string is “TRX1”. If the second instance displays on the main window, the return string is “TRX2”. If the third instance displays on the main window, the return string is ‘TRX3”. If the fourth instance displays on the main window, the return string is “TRX4”.
Preset	Not affected by Preset, reset to “Left” with Restore System Defaults Misc.
State Saved	No
Initial S/W Revision	A.13.80

Module Index (Remote Command Only)

Query only. This will return the index of this xSA instance. This index is used as the device number in a VISA address (“hlislip#”).

Mode	All
Remote Command	`:SYSTem:MODule:INDex?`
Example	:SYST:MOD:IND?
Notes	It returns 0 if this instance’s device number in a VISA address is 0. It returns 1 if this instance’s device number in a VISA address is 1. It returns 2 if this instance’s device number in a VISA address is 2. It returns 3 if this instance’s device number in a VISA address is 3.
Preset	Not affected by Preset, reset to 0 with Restore System Defaults Misc.
State Saved	No
Initial S/W Revision	A.13.80

Module Mnemonic (Remote Command Only)

Query only. This will return the mnemonic of the instance as used in the command line “/Process:<mnemonic>” argument.

Mode	All
Remote Command	`:SYSTem:MODule:MNEMonic?`
Example	:SYST:MOD:MNEM?
Notes	This will return the mnemonic of the instance as used in the command line “/Process:<mnemonic>” argument.
Preset	Not affected by Preset and Restore System Defaults Misc.
State Saved	No
Initial S/W Revision	A.13.80

Module List (Remote Command Only)

Query only. This will return the list of defined mnemonics that can be used in the command line “/Process:<mnemonic>” argument with corresponding configuration information. The comma separated return values are: mnemonic, display name, Enabled/Disabled, VISA device id (instr# or hislip#), telnet port, socket port, Physics port, Physics configuration tag.

Mode	All
Remote Command	`:SYSTem:MODule:LIST?`
Example	:SYST:MOD:LIST?
Notes	Example:

	it returns: TRX1,TRX1,Enabled,0,5023,5025,3574,E6640AModules.config#TRX1 TRX2,TRX2,Disabled,1,5123,5125,3575,E6640AModules.config#TRX2 TRX3,TRX3,Disabled,2,5223,5225,3576,E6640AModules.config#TRX3 TRX4,TRX4,Disabled,3,5323,5325,3577,E6640AModules.config#TRX4
Preset	Not affected by Preset, reset to 0 with Restore System Defaults Misc.
State Saved	No
Initial S/W Revision	A.13.80

Module Enable (Remote Command Only)

Query and command. The query SYST:MOD:ENAB? "<mnemonic>" returns "0" for disabled, "1" for enabled. The command SYST:MOD:ENAB "<mnemonic>" 0|1 will disable/enable the configuration.

Notes: Enabling a configuration that does not have a HW will result in run-time errors when trying to start that configuration. Trying to disable the default configuration will result in the error: –221, "Setting conflict:Cannot disable default process configuration '<mnemonic>".

Example:

}

SCPI>>syst:mod:enab? "TRX1"

<<1

SCPI>>syst:mod:enab? "TRX2"

<<0

SCPI>>syst:err?

<<+0,"No error"

SCPI>>syst:mod:enab "TRX1",0

SCPI>>syst:err?

<<–221,"Settings conflict;Cannot disable default process configuration 'TRX1'"

Mode	All
Remote Command	`:SYSTem:MODule:ENABle? "<mnemonic>"` `:SYSTem:MODule:ENABle "<mnemonic>",0|1`
Example	:SYST:MOD:ENAB? "TRX1" :SYST:MOD:ENAB "TRX4",0

Preset	Not affected by Preset and Restore System Defaults Misc.
State Saved	No
Initial S/W Revision	A.13.80

Module Default (Remote Command Only)

Query and command. The query SYST:MOD:DEF? returns the mnemonic of the default configuration. The command SYST:MOD:DEF “mnemonic>” will set that configuration as the default. If the configuration was disabled, the module default command on it will enable this confutation.

Example:

SCPI>>syst:mod:def?

<<”TRX1”

SCPI>>syst:mod:enab “TRX2”,0

SCPI>>syst:mod:enab? “TRX2”

<<0

SCPI>>syst:mod:def “TRX2”

SCPI>>syst:mod:enab? “TRX2”

<<1

SCPI>>syst:mod:def?

<<”TRX2”

Mode	All
Remote Command	`:SYSTem:MODule:DEFault?` `:SYSTem:MODule:DEFault “<mnemonic>”`
Example	:SYST:MOD:DEF? :SYST:MOD:DEF “TRX1”

Preset	Not affected by Preset, reset to “Left” with Restore System Defaults Misc.
State Saved	No
Initial S/W Revision	A.13.80

Module Model Number (Remote Command Only)

Query only. The query “:SYST:MODule:MODel?” will return model number of the current module.

Mode	All

Remote Command	`:SYSTem:MODule:MODel?`
Example	:SYSTem:MODule:MODel?
Notes	This query will return model number. e.g. “M9430A”
Preset	Not affected by Preset,
State Saved	No
Initial S/W Revision	E.14.14

Module Model Serial Number (Remote Command Only)

Query only. The query “:SYST: MODule:SERial?” will return model serial number of the current module.

Mode	All
Remote Command	`:SYSTem:MODule:SERial?`
Example	:SYSTem:MODule:SERial?
Notes	This query will return model serial number like “SN12344321”
Preset	Not affected by Preset
State Saved	No
Initial S/W Revision	E.14.14

Power On

Enables you to select how the instrument should power on. The options are: Mode and Input/Output Defaults, User Preset and Last State.

NOTE In products that run multiple instances of the X-Series Application, the same Power On type is shared between all the instances.

Key Path	System
Mode	All
Remote Command	`:SYSTem:PON:TYPE MODE|USER|LAST` `:SYSTem:PON:TYPE?`
Example	:SYST:PON:TYPE MODE
Preset	This is unaffected by a Preset but is set to Mode on a “Restore System Defaults->All”
State Saved	No
Backwards Compatibility SCPI	`:SYSTem:PON:TYPE PRESet` the “PRESet” parameter is supported for backward compatibility only and behaves the same as MODE.
Backwards Compatibility Notes	The Preset Type key in legacy analyzers has been removed, and the Power On toggle key has been replaced by this 1-of-N key in the System menu.
Initial S/W Revision	Prior to A.02.00

Mode and Input/Output Defaults

When the analyzer is powered on in Mode and Input/Output Defaults, it performs a Restore Mode Defaults to all modes in the instrument and also performs a Restore Input/Output Defaults.

Persistent parameters (such as Amplitude Correction tables or Limit tables) are not affected at power on, even though they are normally cleared by Restore Input/Output Defaults and/or Restore Mode Defaults.

Key Path	System, Power On
Mode	All
Example	SYST:PON:TYPE MODE
Readback Text	Defaults
Initial S/W Revision	Prior to A.02.00

User Preset

Sets Power On to User Preset. When the analyzer is powered on in User Preset, it will User Preset each mode and switch to the power-on mode. Power On User Preset will not affect any settings beyond what a normal User Preset affects.

NOTE In products that run multiple instances of the X-Series Application, the same User Preset is shared between all the instances.

An instrument could never power up for the first time in User Preset.

Key Path	System, Power On
Mode	All
Example	SYST:PON:TYPE USER
Readback Text	User Preset
Backwards Compatibility Notes	Power On User Preset will cause the instrument to power up in the power-on mode, not the last mode the instrument was in prior to shut down. Also, Power On User Preset will User Preset all modes. This does not exactly match legacy behavior.
Initial S/W Revision	Prior to A.02.00

Last State

Sets Power On to Last. When the analyzer is powered on, it will put all modes in the last state they were in prior to when the analyzer was put into Power Standby and it will wake up in the mode it was last in prior to powering off the instrument. The saving of the active mode prior to shutdown happens behind the scenes when a controlled shutdown is requested by using the front panel power Standby key or by using the remote command SYSTem:PDOWn. The non-active modes are saved as they are deactivated and recalled by Power On Last State.

NOTE In products that run multiple instances of the X-Series Application, each instance has a unique Last State.

An instrument can never power up for the first time in Last.

If line power to the analyzer is interrupted, for example by pulling the line cord plug or by switching off power to a test rack, Power On Last State may not work properly. For proper operation, Power On Last State depends on you shutting down the instrument using the Standby key or the SYSTem:PDOWn SCPI command. This will ensure the last state of each mode is saved and can be recalled during a power up.

Key Path	System, Power On
Mode	All
Example	SYST:PON:TYPE LAST
Notes	Power on Last State only works if you have done a controlled shutdown prior to powering on in Last. If a controlled shutdown is not done when in Power On Last State, the instrument will power up in the last active mode, but it may not power up in the active mode's last state. If an invalid mode state is detected, a Mode Preset will occur. To control the shutdown under remote control use the :SYSTem:PDOWn command.
Readback Text	Last State
Backwards Compatibility Notes	It is no longer possible to power-up the analyzer in the last mode the analyzer was running with that mode in the preset state. (ESA/PSA SYST:PRESET:TYPE MODE with SYST:PON:PRESET) You can power-on the analyzer in the last mode the instrument was running in its last state (SYST:PON:TYPE LAST), or you can specify the mode to power-up in its preset state (SYST:PON:MODE <mode>).
Initial S/W Revision	Prior to A.02.00

Power On Application

Accesses a menu that lists the available Modes and lets you select which Mode is to be the power-on application.

This application is used for Power On Type "Mode and Input/Output Defaults" and Restore System Defaults All.

NOTE In products that run multiple instances of the X-Series Application, the same Power On Application is shared between all the instances.

Key Path	System, Power On
Mode	All
Remote Command	`:SYSTem:PON:MODE SA | BASIC | ADEMOD | NFIGURE | PNOISE | CDMA2K | TDSCDMA | VSA | VSA89601 | WCDMA | WIMAXOFDMA` `:SYSTem:PON:MODE?`
Example	SYST:PON:MODE SA
Notes	The list of possible modes (and remote parameters) to choose from is dependent on which modes are installed in the instrument.
Preset	This is unaffected by a Preset but is set on a "Restore System Defaults->All" to: SEQAN

State Saved	No
Initial S/W Revision	Prior to A.02.00

Configure Applications

The Configure Applications utility can be used to:

- select applications for preload
- determine how many applications can fit in memory at one time
- specify the order of the Modes in the Mode menu.

This utility consists of a window with instructions, a set of "Select Application" checkboxes, a "fuel bar" style memory gauge, and keys that help you set up your configuration.

NOTE **In products that run multiple instances of the X-Series Application, the same Configure Applications Utility is shared between all the instances.**

For more information, see the following topics:

"Preloading Applications" on page 198

"Access to Configure Applications utility" on page 199

"Virtual memory usage" on page 199

Key Path	System, Power On
Example	:SYST:SHOW CAPP Displays the Config Applications screen
Initial S/W Revision	A.02.00

Preloading Applications

During runtime, if a Mode that is not preloaded is selected using the Mode menu or sending SCPI commands, there will be a pause while the Application is loaded. During this pause a message that says "Loading application, please wait ..." is displayed. Once loaded, the application stays loaded, so the next time you select it during a session, there is no delay.

Preloading enables you to "preload" at startup, to eliminate the runtime delay. Preloading an application will cause it to be loaded into the analyzer's memory when the analyzer program starts up. If you do this, the delay will increase the time it takes to start up the analyzer program, but this may be preferable to having to wait the first time you select an application. Note that, once an application is loaded into memory, it cannot be unloaded without exiting and restarting the analyzer program.

Note that there are more applications available for the X-Series than can fit into Windows Virtual Memory. By allowing you to choose which licensed applications to load at startup, the Configure Applications utility allows you to make optimal use of your memory.

Access to Configure Applications utility

A version of the utility runs the first time you power up the analyzer after purchasing it from Keysight. The utility automatically configures preloads so that as many licensed applications as possible are preloaded while keeping the total estimated virtual memory usage below the limit. This auto-configuration only takes place at the very first run, and after analyzer software upgrades.

You may, at any time, manually call up the Configure Applications utility by pressing System, Power On, Configure Applications, to find a configuration that works best for you, and then restart the analyzer program.

The utility may also be called if, during operation of the analyzer, you attempt to load more applications than can fit in memory at once.

Virtual memory usage

There are more applications available for the X-Series than can fit into memory at any one time, so the Configure Applications utility includes a memory tracker that serves two purposes:

1. It will not let you preload more applications than will fit into memory at once.

2. You can determine how many of your favorite applications can reside in memory at one time.

The utility provides a graphical representation of the amount of memory (note that the memory in question here is Virtual memory and is a limitation imposed by the operating system, not by the amount of physical memory you have in your analyzer). You select applications to preload by checking the boxes on the left. Checked applications preload at startup. The colored fuel bar indicates the total memory required when all the checked applications are loaded (either preloaded or selected during runtime).

Here is what the fuel bar colors mean:

RED: the applications you have selected cannot all fit into the analyzer's memory. You must deselect applications until the fuel bar turns yellow.

YELLOW: the applications you have selected can all fit into the analyzer's memory, but there is less than 10% of the memory left, probably not enough to load any other applications, either via preload or by selecting a Mode while the analyzer is running..

GREEN: The indicator is green when <90% of the memory limit is consumed. This means the applications you have selected can all fit into the analyzer's memory with room to spare. You will likely be able to load one or more other applications without running out of memory.

Select All

Marks all applications in the selection list. This allows you to enable all applications licensed on the instrument for pre-loading, or is a convenience for selecting all applications in one operation and then letting you deselect individual applications.

Key Path	System, Power On, Configure Applications
Initial S/W Revision	A.02.00

Deselect All

Clears the marks from all applications in the selection list, except the Power On application. The Power On application cannot be eliminated from the pre-load list.

Key Path	System, Power On, Configure Applications
Initial S/W Revision	A.02.00

Move Up

The application list is the order that applications appear in the Mode Menu. This key enables you to shift the selected application up in the list, thus moving the selected application earlier in the Mode Menu.

Key Path	System, Power On, Configure Applications
Initial S/W Revision	A.02.00

Move Down

The application list is the order that applications appear in the Mode Menu. This key enables you to shift the selected application down in the list, thus moving the selected application later in the Mode Menu.

Key Path	System, Power On, Configure Applications
Initial S/W Revision	A.02.00

Select/Deselect

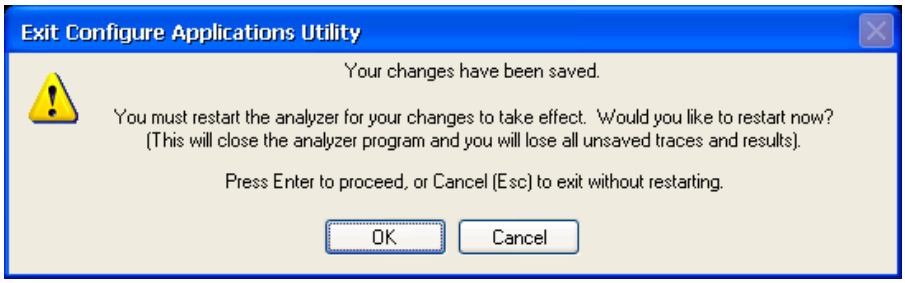
Toggles the currently highlighted application in the list.

Key Path	System, Power On, Configure Applications
Initial S/W Revision	A.02.00

Save Changes and Exit

Applies the configuration of the applications list. The marked applications will be pre-loaded in memory the next time the instrument application is started, and the order of the applications in the list will be the order of the applications in the Mode Menu.

After saving your changes, the analyzer asks you if you would like it to restart so that your changes can take effect (see dialog box, below). If you choose not to restart, the changes will not take affect until the next time you shut down and restart the analyzer.



Key Path	System, Power On, Configure Applications
Remote Command	`:SYSTem:PUP:PROCess`
Example	:SYST:PUP:PROC This is the SCPI command for restarting the analyzer. You must Wait after this command for the instrument application to restart
Notes	The softkey will be grayed-out when the virtual memory of the selected applications exceeds 100% of the limit.
Notes	You cannot use *WAI or *OPC? to synchronize operation after a restart. This command stops and restarts the instrument application, thus the SCPI operation is terminated and restarted. A remote program must use fixed wait time to resume sending commands to the instrument. The wait time will be dependent upon which applications are pre-loaded.
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.04.00

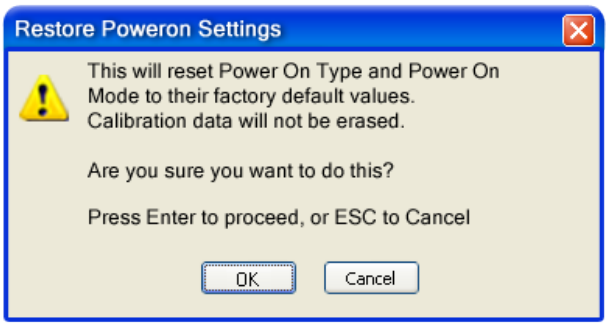
Exit Without Saving

Pressing this key will exit the Configure Applications utility without saving your changes.

Key Path	System, Power On, Configure Applications
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.04.00

Restore Power On Defaults

This selection causes the Power On Type and Power On Application settings to be a reset to their default values. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch. The Power On key, under the Restore System Defaults menu, causes the same action.



If you press any key other than OK or Enter, it is construed as a Cancel, because the only path that will actually cause the reset to be executed is through OK or Enter.

Key Path	System, Power On
Example	:SYST:DEF PON
Initial S/W Revision	Prior to A.02.00

Configure Applications - Instrument boot-up

At start-up of the analyzer programa dialog box similar to the one under the System, Power On, Configure Applications key will be displayed allowing you to choose which licensed applications are to be loaded. This dialog will only be displayed if the memory required to pre-load all of the licensed applications exceeds the Virtual Memory available.

Configure Applications - Windows desktop

The Configure Applications Utility may be run from the Windows Desktop. The utility is launched by double-clicking the

icon on the desktop, which brings-up a dialog box similar to the one under the System, Power On, Configure Applications key, allowing you to choose which licensed applications are to be loaded when the analyzer program starts up. This dialog box has mouse buttons on it that do the job the softkeys normally do in the System, Power On, Configure Applications menu.

NOTE In products that run multiple instances of the X-Series Application, the same Configure Applications Utility launched from the Windows Desktop will apply to all the instances.

Configure Applications - Remote Commands

The following topics provide details on using remote commands to configure the list of applications you want to load into the instrument memory or query the Virtual Memory utilization for your applications.

- "Configuration list (Remote Command Only)" on page 203
- "Configuration Memory Available (Remote Command Only)" on page 203
- "Configuration Memory Total (Remote Command Only)" on page 203
- "Configuration Memory Used (Remote Command Only)" on page 203

- "Configuration Application Memory (Remote Command Only)" on page 204

Configuration list (Remote Command Only)

This remote command is used to set or query the list of applications to be loaded in-memory.

Remote Command	`:SYSTem:PON:APPLication:LLISt <string of INSTrument:SELect names>` `:SYSTem:PON:APPLication:LLISt?`
Example	:SYST:PON:APPL:LLIS "SA,BASIC,WCDMA"
Notes	<string of INSTrument:SELect names> are from the enums of the :INSTrument:SELect command. The order of the <INSTrument:SELect names> is the order that the applications are loaded into memory, and the order that they appear in the Mode Menu. Error message –225 "Out of Memory" is reported when more applications are listed than can reside in Virtual Memory. When this occurs, the existing applications load list is unchanged.
Preset	Not affected by Preset
State Saved	Not saved in instrument state
Initial S/W Revision	A.02.00

Configuration Memory Available (Remote Command Only)

This remote command is used to query the amount of Virtual Memory remaining.

Remote Command	`:SYSTem:PON:APPLication:VMEMory[:AVAilable]?`
Example	:SYST:PON:APPL:VMEM?
Preset	Not affected by Preset
Initial S/W Revision	A.02.00

Configuration Memory Total (Remote Command Only)

This remote command is used to query the limit of Virtual Memory allowed for applications.

Remote Command	`:SYSTem:PON:APPLication:VMEMory:TOTal?`
Example	:SYST:PON:APPL:VMEM:TOT?
Preset	Not affected by Preset
Initial S/W Revision	A.02.00

Configuration Memory Used (Remote Command Only)

This remote command is a query of the amount of Virtual Memory used by all measurement applications.

Remote Command	`:SYSTem:PON:APPLication:VMEMory:USED?`
Example	:SYST:PON:APPL:VMEM:USED?

Preset	Not affected by Preset
Initial S/W Revision	A.02.00

Configuration Application Memory (Remote Command Only)

This remote command is used to query the amount of Virtual Memory a particular application consumes.

Remote Command	`:SYSTem:PON:APPLication:VMEMory:USED:NAME? <INSTrument:SELect name>`
Example	:SYST:PON:APPL:VMEM:USED:NAME? CDMA2K
Notes	<INSTrument:SELect name> is from the enums of the :INSTrument:SELect command Value returned will be 0 (zero) if the name provided is invalid.
Preset	Not affected by Preset
Initial S/W Revision	Prior to A.02.00

Alignments

The Alignments Menu controls and displays the automatic alignment of the instrument, and provides the ability to restore the default alignment values.

The current setting of the alignment system is displayed in the system Settings Panel along the top of the display, including a warning icon for conditions that may cause specifications to be impacted.

Key Path	System
Initial S/W Revision	Prior to A.02.00

Align Now

Accesses alignment processes that are immediate action operations. They perform complete operations and run until they are complete.

Key Path	System, Alignments
Initial S/W Revision	Prior to A.02.00

All (Daily use)

Immediately executes an alignment of all subsystems which includes both the source and the analyzer in the TRX module. The “All” alignment is sufficient to maintain specified performance, provided that (1) the TRX’s internal temperature has not drifted more than +/–5 degree C since the previous alignment, and (2) no more than 8 hours have elapsed since the previous “All” alignment., and (3) no more than 1 week has elapsed since these three alignments have all been run: IF, RF, and Source, and (4) a 45 minute warm-up

period between power-up of the TRX and invoking the “All” alignment. The instrument stops any measurement currently underway, performs the alignment, then restarts the measurement from the beginning (similar to pressing the Restart key).

If an interfering user signal is present at the RF Input, the alignment is performed on all subsystems except the RF. After completion, the Error Condition message “Align skipped: 50 MHz interference” or “Align skipped: 4.8 GHz interference” is generated. In addition the Error Condition message “Align Now, RF required” is generated, and bits 11 and 12 are set in the Status Questionable Calibration register.

The query form of the remote commands (:CALibration[:ALL]? or *CAL?) invokes the alignment of all subsystems and returns a success or failure value. An interfering user signal is not grounds for failure; if the alignment was able to succeed on all portions but unable to align the RF because of an interfering signal, the resultant will be the success value.

Successful completion of Align Now, All will clear the “Align Now, All required” Error Condition, and clear bit 14 in the Status Questionable Calibration register. It will also begin the elapsed time counter for Last Align Now, All Time, and capture the Last Align Now, All Temperature.

If the Align RF subsystem succeeded in aligning (no interfering signal present), the elapsed time counter begins for Last Align Now, RF Time, and the temperature is captured for the Last Align Now, RF Temperature. In addition the Error Conditions “Align skipped: 50 MHz interference” and “Align skipped: 4.8 GHz interference” are cleared, the Error Condition “Align Now, RF required” is cleared, and bits 11 and 12 are cleared in the Status Questionable Calibration register

Align Now, All can be interrupted by pressing the Cancel (ESC) front-panel key or remotely with Device Clear followed by the :ABORt SCPI command. When this occurs the Error Condition message “Align Now, All required” is generated, and bit 14 is set in the Status Questionable Condition register. This is because new alignment data may be employed for an individual subsystem, but not a cohesive set of data for all subsystems.

In many cases, you might find it more convenient to change alignments to Normal, instead of executing Align Now, All. When the Auto Align process transitions to Normal, the analyzer will immediately start to update only the alignments that have expired, thus efficiently restoring the alignment process.

NOTE In EXM, Source ARB play will be turned off and the source states will not be restored after Align Now, All.

Key Path	System, Alignments, Align Now
Mode	All
Remote Command	`:CALibration[:ALL]` `:CALibration[:ALL]?`
Example	:CAL
Notes	:CALibration[:ALL]? returns 0 if successful :CALibration[:ALL]? returns 1 if failed :CALibration[:ALL]? is the same as *CAL? While Align Now, All is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command.

	Successful completion will clear bit 14 in the Status Questionable Calibration register. An interfering user signal is not grounds for failure of Align Now, All. However, bits 11 and 12 are set in the Status Questionable Calibration register to indicate Align Now, RF is required. An interfering user supplied signal will result in the instrument requiring an Align Now, RF with the interfering signal removed.
Couplings	Initializes the time for the Last Align Now, All Time. Records the temperature for the Last Align Now, All Temperature. If Align RF component succeeded, initializes the time for the Last Align Now, RF Time. If Align RF component succeeded, records the temperature for the Last Align Now, RF Temperature.
Status Bits/OPC dependencies	Bits 11, 12, or 14 may be set in the Status Questionable Calibration register.
Initial S/W Revision	Prior to A.02.00

Mode	All
Remote Command	`*CAL?`
Example	*CAL?
Notes	*CAL? returns 0 if successful *CAL? returns 1 if failed :CALibration[:ALL]? is the same as *CAL? See additional remarks described with :CALibration[:ALL]? Everything about :CALibration[:ALL]? is synonymous with *CAL? including all conditions, status register bits, and couplings
Initial S/W Revision	Prior to A.02.00

Mode	All
Remote Command	`:CALibration[:ALL]:NPENding`
Example	CAL:NPEN
Notes	:CALibration[:ALL]:NPENding is the same as :CALibration[:ALL] including all conditions, status register bits, except this scpi command does not BLOCK the scpi session, so the user should use status register bits to query if the calibration is successfully completed or not. Typical usage is: 1) :CALibration:ALL:NPENding (Start a calibration) 2) :STATus:OPERation:CONDition? (Check if the calibration is completed or not, If bit 0 is set, then the system is doing calibration, the user should repeat this scpi query until the bit is cleared) 3):STATus:QUEStionable:CALibration:CONDition? (Check if if there are any errors/failures in previous calibration procedure
Initial S/W Revision	X.14.20

All but RF

Immediately executes an alignment of all subsystems except the RF subsystem which includes both the source and the analyzer in the TRX module . The instrument will stop any measurement currently underway, perform the alignment, and then restart the measurement from the beginning (similar to pressing the Restart key). This can be used to align portions of the instrument that are not impacted by an interfering user input signal.

This operation might be chosen instead of All if you do not want the device under test to experience a large change in input impedance, such as a temporary open circuit at the analyzer input.

The query form of the remote commands (:CALibration:NRF?) will invoke the alignment and return a success or failure value.

Successful completion of Align Now, All but RF will clear the “Align Now, All required” Error Condition, and clear bit 14 in the Status Questionable Calibration register. If “Align Now, All required” was in effect prior to executing the All but RF, the Error Condition message “Align Now, RF required” is generated and bit 12 in the Status Questionable Calibration register is set. It will also begin the elapsed time counter for Last Align Now, All Time, and capture the Last Align Now, All Temperature.

Align Now, All but RF can be interrupted by pressing the Cancel (ESC) front-panel key or remotely with Device Clear followed by the :ABORt SCPI command. When this occurs the Error Condition message “Align Now, All required” is generated, and bit 14 is set in the Status Questionable Condition register. This is because new alignment data may be used for an individual subsystem, but not a full new set of data for all subsystems.

NOTE In EXM, Source ARB play will be turned off and the source states will not be restored after Align Now, All but RF.

Key Path	System, Alignments, Align Now
Mode	All
Remote Command	`:CALibration:NRF` `:CALibration:NRF?`
Example	:CAL:NRF
Notes	:CALibration:NRF? returns 0 if successful :CALibration:NRF? returns 1 if failed While Align Now, All but RF is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. Successful completion will clear bit 14 in the Status Questionable Calibration register and set bit 12 if invoked with “Align Now, All required”.
Couplings	Initializes the time for the Last Align Now, All Time. Records the temperature for the Last Align Now, All Temperature.
Status Bits/OPC dependencies	Bits 12 or 14 may be set in the Status Questionable Calibration register.
Initial S/W Revision	Prior to A.02.00

Mode	All
Remote Command	`:CALibration:NRF:NPENding`
Example	CAL:NRF:NPEN
Notes	:CALibration:NRF:NPENding is the same as :CALibration:NRF including all conditions, status register bits, except that this scpi command does not BLOCK the scpi session, so the user should use status register bits to query if the calibration is successfully completed or not. Typical usage is: 1):CALibration:NRF:NPENding (start theAll but RF calibration) 2):STATus:OPERation:CONDition? (If bit 0 is set, then the system is doing calibration, the user should do re-query until this bit is cleared) 3):STATus:QUEStionable:CALibration:CONDition? (to check if there are any errors/failures in previous calibration procedure)
Initial S/W Revision	X.14.20

RF (Weekly use)

Immediately executes an alignment of the RF subsystem which includes both the source and the analyzer in the TRX module . The instrument stops any measurement currently underway, performs the alignment, then restarts the measurement from the beginning (similar to pressing the Restart key).

This alignment corrects slow-rate drift which does not impair specifications for time periods shorter than one week. Thus, it is required to perform this alignment on a weekly basis to maintain specifications. This alignment typically takes >2 minutes to complete.

This operation might be desirable if the alignments had been set to not include RF alignments, or if previous RF alignments could not complete because of interference which has since been removed.

If an interfering user signal is present at the RF Input, the alignment will terminate and generate the Error Condition message “Align skipped: 50 MHz interference” or “Align skipped: 4.8 GHz interference”, and Error Condition “Align Now, RF required”. In addition, bits 11 and 12 will be set in the Status Questionable Calibration register.

The query form of the remote commands (:CALibration:RF?) will invoke the alignment of the RF subsystem and return a success or failure value. An interfering user signal is grounds for failure.

Successful completion of Align Now, RF will begin the elapsed time counter for Last Align Now, RF Time, and capture the Last Align Now, RF Temperature.

Align Now, RF can be interrupted by pressing the Cancel (ESC) front-panel key or remotely with Device Clear followed by the :ABORt SCPI command. When this occurs, the Error Condition message “Align Now, RF required” is generated, and bit 12 is set in the Status Questionable Condition register. None of the new alignment data is used.

NOTE In EXM, Source ARB play will be turned off and the source states will not be restored after Align Now, All but RF.

Key Path	System, Alignments, Align Now
Mode	All
Remote Command	`:CALibration:RF` `:CALibration:RF?`
Example	:CAL:RF
Notes	:CALibration:RF? returns 0 if successful :CALibration:RF? returns 1 if failed (including interfering user signal) While Align Now, RF is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. Successful completion clears the Error Conditions “Align skipped: 50 MHz interference” and “Align skipped: 4800 MHz interference” and the Error Conditions “Align RF failed” and “Align Now, RF required”, and clears bits 3, 11, and 12 in the Status Questionable Calibration register. A failure encountered during alignment will generate the Error Condition message “Align RF failed” and set bit 3 in the Status Questionable Calibration register. An interfering user signal will result in bits 11 and 12 to be set in the Status Questionable Calibration register to indicate Align Now, RF is required. An interfering user supplied signal will result in the instrument requiring an Align Now, RF with the interfering signal removed.
Couplings	Initializes the time for the Last Align Now, RF Time. Records the temperature for the Last Align Now, RF Temperature.
Status Bits/OPC dependencies	Bits 11, 12, or 14 may be set in the Status Questionable Calibration register.
Initial S/W Revision	Prior to A.02.00

Mode	All
Remote Command	`:CALibration:RF:NPENding`
Example	CAL:RF:NPEN
Notes	:CALibration:RF:NPENding is the same as :CALibration:RF including all conditions, status register bits, except that this scpi command does not BLOCK the scpi session, so the user should use status register bits to query if the calibration is successfully completed or not. Typical usage is: 1):CALibration:RF:NPENding (Start a RF calibration) 2):STATus:OPERation:CONDition? (If bit 0 is set, then the system is doing calibration, the user should do re-query until this bit is cleared) 3):STATus:QUEStionable:CALibration:CONDition? (to check if there are any errors/failures in previous calibration procedure)
Initial S/W Revision	X.14.20

Source (Weekly use)

Accesses source alignment processes that are immediate action operations. They perform complete operations and run until they are complete.

Immediately executes an IQ alignment, and power level alignment. The instrument stops any sequence of the source, performs the alignment, then restarts the sequence from the beginning.

This alignment corrects slow-rate drift which does not impair specifications for time periods shorter than one week. Thus, it is required to perform this alignment on a weekly basis to maintain specifications. This alignment typically takes >2 minutes to complete.

There is no alert available for the source alignment. The operators have the responsibility to check temperature shift since last Align Now, Source to determine if the source alignment needs to be executed.

Key Path	System, Alignments, Align Now
Mode	All
Remote Command	`:CALibration:INTernal:SOURce[:ALL]` `:CALibration:INTernal:SOURce[:ALL]?`
Example	:CAL:INT:SOUR
Notes	:CAL:SOUR? Initiates an Alignment and returns 0 if successful :CAL:SOUR? Initiates an Alignment and returns 1 if failed
Couplings	Initializes the time for the Last Align Source Now, All Time. Records the temperature for the Last Align Source Now, All Temperature.
Initial S/W Revision	A.05.00

Mode	All
Remote Command	`:CALibration:INTernal:SOURce[:ALL]:NPENding`
Example	CAL:INT:SOUR:NPEN
Notes	:CALibration:INTernal:SOURce[:ALL]:NPENding is the same as :CALibration:INTernal:SOURce[:ALL] including all conditions, status register bits, except that this scpi command does not BLOCK the scpi session, so the user should use status register bits to query if the calibration is successfully completed or not. Typical usage is: 1):CALibration:INTernal:SOURce:NPENding (start an internal source calibration) 2):STATus:OPERation:CONDition? (Check if the calibration is completed or not, If bit 0 is set, then the system is doing calibration, the user should repeat this scpi query until the bit is cleared) 3):STATus:QUEStionable:CALibration:EXTended:FAILure:CONDition? (Check if bit 14 is set or not. If this bit is set, that means there are some errors in previous internal source calibration)
Initial S/W Revision	X.14.20

IF Alignment (Weekly use) (Remote Command Only)

Immediately executes an alignment of the IF subsystem which includes both the source and the analyzer in the TRX module. The instrument stops any measurement currently underway, perform the alignment, and then restart the measurement from the beginning (similar to pressing the Restart key). This alignment corrects slow-rate which the drift does not impair specifications for time periods shorter than one week. Thus, it is required to perform this alignment on a weekly basis to maintain specifications. This alignment typically takes >4 minutes to complete.

A failure of IF will set the Error Condition “Align IF failed” and set bit 4 in the Status Questionable Calibration register. A failure will not employ new IF alignment data.

Successful completion of IF will clear the Error Condition “Align IF failed” and clear bit 6 in the Status Questionable Calibration register.

Align IF can be interrupted by pressing the Cancel (ESC) front-panel key or from remote with Device Clear followed by the :ABORt SCPI command. When this occurs, no new IF alignment data will be employed.

The query form of the remote commands (:CALibration:IF?) will invoke the alignment of the IF subsystem and return a success or failure value.

Note: In EXM, Source ARB play will be turned off and the source states will not be restored after IF Alignment.

Mode	All
Remote Command	`:CALibration:IF` `:CALibration:IF?`
Example	:CAL:IF
Notes	:CALibration:IF? returns 0 if successful :CALibration:IF? returns 1 if failed While Align Now, IF is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. Successful completion will clear bit 14 in the Status Questionable Calibration register.
Preset	Not affected by Preset and Restore System Defaults Misc.
State Saved	No
Initial S/W Revision	E.14.00

Mode	All
Remote Command	`:CALibration:IF:NPENding`
Example	CAL:IF:NPEN
Notes	:CALibration:IF:NPENding is the same as :CALibration:IF including all conditions, status register bits, except that this scpi command does not BLOCK the scpi session, so the user should use status register bits to query if the calibration is successfully

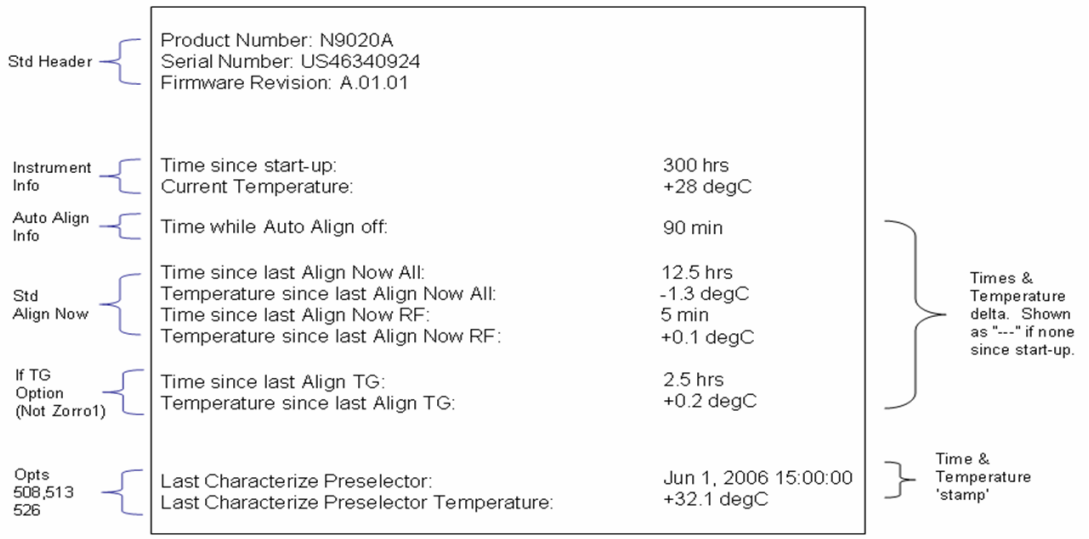
	completed or not. Typical usage is: 1) :CALibration:IF:NPENding (Start a IF calibration) 2) :STATus:OPERation:CONDition? (Check if the calibration is completed or not, If bit 0 is set, then the system is doing calibration, the user should repeat this scpi query until the bit is cleared) 3):STATus:QUEStionable:CALibration:CONDition? (Check if bit 4 is set or not. If this bit is set, that means there are some errors in previous internal source calibration)
Initial S/W Revision	X.14.20

Show Alignment Statistics

Shows alignment information you can use to ensure that the instrument is operating in a specific manner. The Show Alignment Statistics screen is where you can view time and temperature information.

Values which are displayed are only updated when the Show Alignment Statistics screen is invoked, they are not updated while the Show Alignment Statistics screen is being displayed. The remote commands that access this information obtain current values.

An example of the Show Alignment Statistics screen would be similar to:



A successful Align Now, RF will set the Last Align RF temperature to the current temperature, and reset the Last Align RF time. A successful Align Now, All or Align Now, All but RF will set the Last Align Now All temperature to the current temperature, and reset the Last Align Now All time. A successful Align Now, All will also reset the Last Align RF items if the RF portion of the Align Now succeeded.

Key Path	System, Alignments
Mode	All
Notes	The values displayed on the screen are only updated upon entry to the screen and not updated while

	the screen is being displayed.
Initial S/W Revision	Prior to A.02.00

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	`:SYSTem:PON:TIME?`
Example	:SYST:PON:TIME?
Notes	Value is the time since the most recent start-up in seconds.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	`:CALibration:TEMPerature:CURRent?`
Example	:CAL:TEMP:CURR?
Notes	Value is in degrees Centigrade. Value is invalid if using default alignment data (Align Now, All required)
State Saved	No
Initial S/W Revision	Prior to A.02.00

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	`:CALibration:TIME:LALL?`
Example	:CAL:TIME:LALL?
Notes	Value is the elapsed time, in seconds, since the last successful Align Now, All or Align Now, All but RF was executed.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	`:CALibration:TEMPerature:LALL?`
Example	:CAL:TEMP:LALL?
Notes	Value is in degrees Centigrade at which the last successful Align Now, All or Align Now, All but RF

	was executed.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	`:CALibration:TIME:LRF?`
Example	:CAL:TIME:LRF?
Notes	Value is the elapsed time, in seconds, since the last successful Align Now, RF was executed, either individually or as a component of Align Now, All.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	`:CALibration:TEMPerature:LRF?`
Example	:CAL:TEMP:LRF?
Notes	Value is in degrees Centigrade at which the last successful Align Now, RF was executed, either individually or as a component of Align Now, All.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Key Path	SCPI Only
Mode	All
Remote Command	`:CALibration:TIME:LIF?`
Example	:CAL:TIME:LIF?
Notes	Value is the elapsed time, in seconds, since the last successful Align IF was executed.
State Saved	No
Initial S/W Revision	A.14.50

Key Path	SCPI Only
Mode	All
Remote Command	`:CALibration:TEMPerature:LIF?`

Example	:CAL:TEMP:LIF?
Notes	Value is in degrees Centigrade at which the last successful Align IF was executed.
State Saved	No
Initial S/W Revision	A.14.50

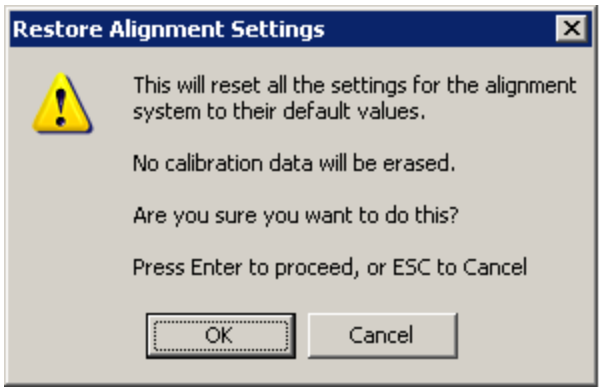
Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	`:CALibration:TIME:SOURce:LALL?`
Example	:CAL:TIME:SOUR:LALL?
Notes	Value is the date and time of the last successful Align Now, Source was performed on the instrument.
State Saved	No
Initial S/W Revision	A.05.00

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	`:CALibration:TEMPerature:SOURce: LALL?`
Example	:CAL:TEMP:SOUR:LALL?
Notes	Value is in degrees Centigrade at which the last successful Align Now, Sourcewas performed on the instrument.
State Saved	No
Initial S/W Revision	A.05.00

Restore Align Defaults

Initializes the alignment user interface settings, not alignment data, to the factory default values. Align Now, All must be executed if the value of the Timebase DAC results in a change.

For front panel operation, you are prompted to confirm action before setting the alignment parameters to factory defaults:



The parameters affected are:

Parameter	Setting
Timebase DAC	Calibrated
Timebase DAC setting	Calibrated value
Auto Align State	Normal (if the instrument is not operating with default alignment data, Off otherwise)
Auto Align All but RF	Off
Auto Align Alert	Time & Temperature

Key Path	System, Alignments
Mode	All
Example	:SYST:DEF ALIG
Notes	Alignment processing that results as the transition to Auto Alignment Normal will be executed sequentially; thus *OPC? or *WAI will wait until the alignment processing is complete.
Initial S/W Revision	Prior to A.02.00

Execute Expired Alignments (Remote Command Only)

Alignments can be expired in the situation where Auto Align is in the state of Partial or Off. This feature runs the alignments that have expired. This is different than performing an Align All, Now operation. Align All, Now performs an alignment of all subsystems regardless of whether they are needed or not, with Execute Expired Alignments, only the individual subsystems that have become due are aligned.

Mode	All
Remote Command	`:CALibration:EXPired?`
Example	:CAL:EXP?
Notes	:CALibration:EXPired? returns 0 if successful :CALibration:EXPired? returns 1 if failed
Initial S/W Revision	Prior to A.02.00

I/O Config

Activates a menu for identifying and changing the I/O configuration for remote control.

Key Path	System
Initial S/W Revision	Prior to A.02.00

SCPI LAN

Activates a menu for identifying and changing the SCPI over a LAN configuration. There are a number of different ways to send SCPI remote commands to the instrument over LAN. It can be a problem to have multiple users simultaneously accessing the instrument over the LAN. These keys limit that somewhat by disabling the telnet, socket, and/or SICL capability.

NOTE Telnet port 5023, socket port 5025, SICL server 0 and HiSLIP server 0 will be assigned to first instance; Telnet port 5123, socket port 5125, SICL server 1 and HiSLIP server 1 will be assigned to second instance; Telnet port 5223, socket port 5225, SICL server 2 and HiSLIP server 2 will be assigned to third instance; Telnet port 5323, socket port 5325, SICL server 3 and HiSLIP server 3 will be assigned to the fourth instance.

Key Path	System, I/O Config
Initial S/W Revision	Prior to A.02.00

SCPI Telnet

Turns the SCPI LAN telnet capability On or Off allowing you to limit SCPI access over LAN through telnet.

Key Path	System, I/O Config, SCPI LAN
Mode	All
Remote Command	`:SYSTem:COMMunicate:LAN:SCPI:TELNet:ENABle OFF|ON|0|1` `:SYSTem:COMMunicate:LAN:SCPI:TELNet:ENABle?`
Example	:SYST:COMM:LAN:SCPI:TELN:ENAB OFF
Preset	This is unaffected by Preset but is set to ON with a “Restore System Defaults->Misc”
State Saved	No
Range	On | Off
Initial S/W Revision	Prior to A.02.00

SCPI Socket

Turns the capability of establishing Socket LAN sessions On or Off. This allows you to limit SCPI access over LAN through socket sessions.

Key Path	System, I/O Config, SCPI LAN
Mode	All
Remote Command	`:SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle OFF|ON|0|1` `:SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle?`
Example	:SYST:COMM:LAN:SCPI:SOCK:ENAB OFF
Preset	This is unaffected by a Preset but is set to ON with a “Restore System Defaults->Misc”
State Saved	No
Range	On | Off
Initial S/W Revision	Prior to A.02.00

SICL Server

Turns the SICL server capability On or Off, enabling you to limit SCPI access over LAN through the SICL server. (SICL IEEE 488.2 protocol.)

Parameter	Description	Setting
Maximum Connections	The maximum number of connections that can be accessed simultaneously	5
Instrument Name	The name (same as the remote SICL address) of your analyzer	inst0
Instrument Logical Unit	The unique integer assigned to your analyzer when using SICL LAN	8
Emulated GPIB Name	The name (same as the remote SICL address) of the device used when communicating with your analyzer	gpib7
Emulated GPIB Logical Unit	The unique integer assigned to your device when it is being controlled using SICL LAN	8
Emulated GPIB Address	The emulated GPIB address assigned to your transmitter tester when it is a SICL server (the same as your GPIB address)	18

Key Path	System, I/O Config, SCPI LAN
Mode	All
Remote Command	`:SYSTem:COMMunicate:LAN:SCPI:SICL:ENABle OFF|ON|0|1` `:SYSTem:COMMunicate:LAN:SCPI:SICL:ENABle?`
Example	:SYST:COMM:LAN:SCPI:SICL:ENAB OFF
Preset	This is unaffected by Preset, but is set to ON with a “Restore System Defaults->Misc”
State Saved	No
Range	On | Off
Initial S/W Revision	Prior to A.02.00

HiSLIP Server

Turns the HiSLIP server capability On or Off, enabling you to limit SCPI access over LAN through the HiSLIP server.

HiSLIP stands for High Speed LAN Instrument Protocol and is part of the IVI–6.1 specification.

Here is an example of a VISA connection string used to connect to the HiSLIP Server on an X-Series Spectrum Analyzer:

TCPIP0::a-n9030a–93016::hislip0::INSTR

In the example above, hislip0 is the HiSLIP device name that VISA users must include in their HiSLIP VISA Address strings. Your HiSLIP device name may be different depending on your VISA settings.

Key Path	System, I/O Config, SCPI LAN
Mode	All
Remote Command	`:SYSTem:COMMunicate:LAN:SCPI:HISLip:ENABle OFF|ON|0|1` `:SYSTem:COMMunicate:LAN:SCPI:HISLip:ENABle?`
Example	:SYST:COMM:LAN:SCPI:HISL:ENAB OFF
Preset	This is unaffected by Preset, but is set to ON with a “Restore System Defaults->Misc”
State Saved	No
Range	On | Off
Initial S/W Revision	A.11.00

SCPI Socket Control Port (Remote Command Only)

Returns the TCP/IP port number of the control socket associated with the SCPI socket session. This query enables you to obtain the unique port number to open when a device clear is to be sent to the instrument. Every time a connection is made to the SCPI socket, the instrument creates a peer control socket. The port number for this socket is random. The user must use this command to obtain the port number of the control socket. To force a device clear on this socket, open the port and send the string “DCL ” to the instrument.

If this SCPI command is sent to a non SCPI Socket interface, then 0 is returned.

Mode	All
Remote Command	`:SYSTem:COMMunicate:LAN:SCPI:SOCKet:CONTrol?`
Example	:SYST:COMM:LAN:SCPI:SOCK:CONT?
Preset	This is unaffected by Preset or “Restore System Defaults->Misc”.
State Saved	No
Range	0 to 65534
Min	0
Max	65534
Initial S/W Revision	Prior to A.02.00

System IDN Response

This key allows you to specify a response to the *IDN? query, or to return the analyzer to the Factory response if you have changed it.

To choose the factory-set response, press the Factory key.

To specify your own response, press the User key, and enter your desired response.

If your test software is expecting the response to indicate Agilent Technologies as the Manufacturer, you can conveniently configure the response by pressing the Agilent key.

Key Path	System, I/O Config
Mode	All
Remote Command	
Notes	• This affects the response given in all Modes of the Analyzer, unless the current Mode has also specified a custom response, in which case the current Mode's custom IDN response takes precedence over the System's, but only while that Mode is the current Mode.. • It survives shutdown and restart of the software and therefore survives a power cycle
Preset	This is unaffected by Preset but is set to Factory on a "Restore System Defaults->Misc"
State Saved	No
Initial S/W Revision	A.06.00
Modified at S/W Revision	x.14.50

Factory

This key selects the factory setting, for example:

"Agilent Technologies,E6640,MY00012345, E.14.50"

where the fields are manufacturer, model number, serial number, firmware revision.

Note: In products that run multiple instances of the X-Series Application, all instances use the same factory System IDN response.

Key Path	System, I/O Config, IDN Response
Example	:SYST:IDN:CONF FACT
Initial S/W Revision	A.06.0

User

This key allows you to specify your own response to the *IDN? query. You may enter your desired response with the Alpha Editor or a plugin PC keyboard.

When you press this key, the active function becomes the current User string with the cursor at the end. This makes it easy to edit the existing string.

If you enter a null string (for example, by clearing the User String while editing and then pressing Done) the analyzer automatically reverts to the Factory setting.

Note: In products that run multiple instances of the X-Series Application, all instances use the same User System IDN response.

Key Path	System, I/O Config, IDN Response
Example	:SYST:IDN:CONF USER
Initial S/W Revision	A.06.00

SYSTem:IDN Response setting (Remote command)

This SCPI command is used to set or clear the User SYSTem:IDN response.

Remote Command	`:SYSTem:IDN <string>` `:SYSTem:IDN?`
Notes	• The format of the <string> must be four fields each separated by a comma, example: :SYST:IDN "XYZ Corp,Model 12,012345,A.01.01" • The four fields are <manufacturer>, <model number>, <serial number>, <firmware revision>. Thus, the text within a field cannot contain a comma. • This affects the response given in all Modes of the Analyzer, unless the current Mode has also specified a custom response, in which case the current Mode's custom IDN response takes precedence over the System's, but only while that Mode is the current Mode.. • It survives shutdown and restart of the software and therefore survives a power cycle • Null string as parameter restores the Factory setting, example: :SYST:IDN ""
Preset	This is unaffected by Preset but is set to the original factory setting on a "Restore System Defaults->Misc"
Initial S/W Revision	A.06.00

Restore Defaults

Provides incremental initialization of the system setting groups along with supporting a comprehensive reset of the entire instrument back to a factory default state. The menu selections are the groups of system settings and when one is selected, that particular group of system settings is reset back to their default values.

NOTE In products that run multiple instances of the X-Series Application, all insances have the same factory default states for Restore Defaults.

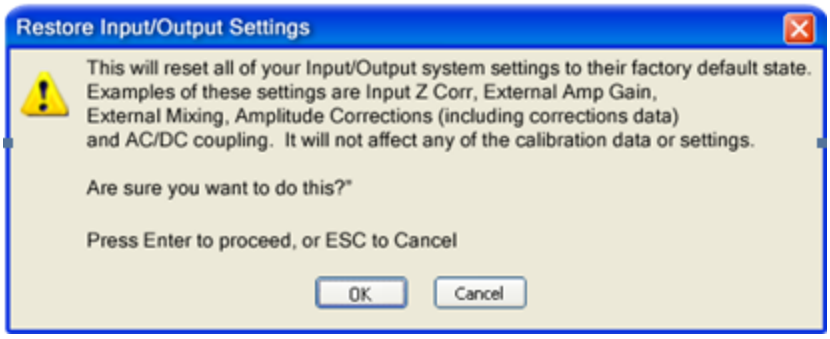
Key Path	System
Mode	All
Remote Command	`:SYSTem:DEFault [ALL]|ALIGn|INPut|MISC|MODes|PON`

Example	SYST:DEF
State Saved	No
Initial S/W Revision	Prior to A.02.00

Restore Input/Output Defaults

Causes the group of settings and data associated with Input/Output front-panel key to be a reset to their default values. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch. .

Confirmation is required to restore the Input/Output setting. The confirmation dialog is:

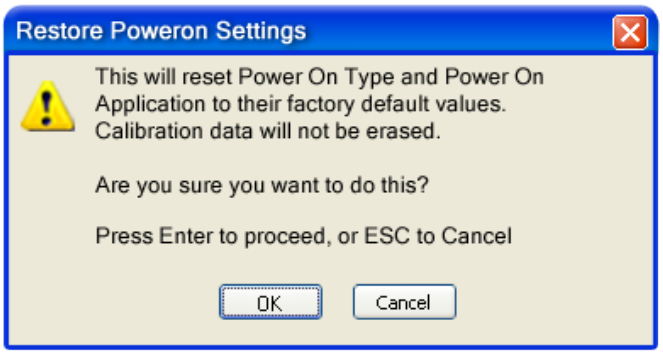


Key Path	System, Restore System Defaults
Example	:SYST:DEF INP
Initial S/W Revision	Prior to A.02.00

Restore Power On Defaults

This selection causes the Power On settings to be a reset to their default value. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch. The Power On settings and their default values are Power On Type reset to Mode and Input/Output Defaults and Power On Application reset to whatever the factory set as its default value.

Confirmation is required to restore the factory default values. The confirmation dialog is:



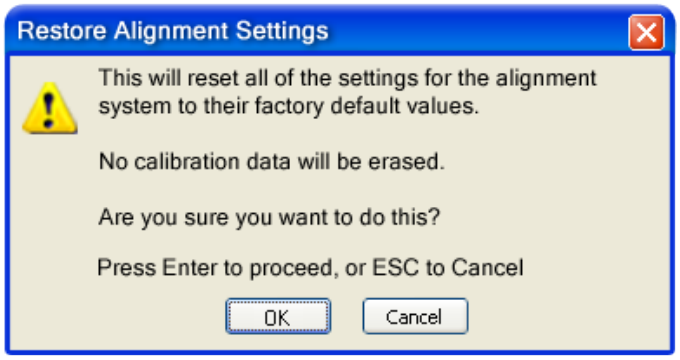
Key Path	System, Restore System Defaults
Example	:SYST:DEF PON
Initial S/W Revision	Prior to A.02.00

Restore Align Defaults

This selection causes the Alignment system settings to be a reset to their default values. This does not affect any Alignment data stored in the system. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch.

After performing this function, it may impact the auto-alignment time of the instrument until a new alignment baseline has been established.

Confirmation is required to restore the factory default values. The confirmation dialog is:



Key Path	System, Restore System Defaults
Example	:SYST:DEF ALIG
Initial S/W Revision	Prior to A.02.00

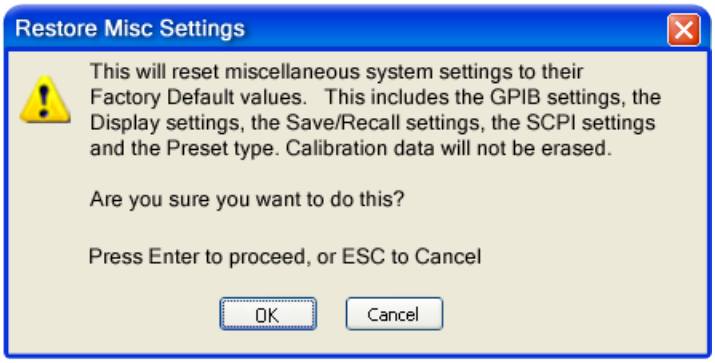
Restore Misc Defaults

This selection causes miscellaneous system settings to be reset to their default values. With this reset, you lose the GPIB address and it is reset to 18, so this should be used with caution. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch. This miscellaneous group contains the rest of the settings that have not been part of the other Restore System Defaults groups. The following table is a complete list of settings associated with this group:

Miscellaneous Setting	Default Value
Verbose SCPI	Off
The SYST:PRES:TYPE	MODE
Auto File Name Number	000

Miscellaneous Setting	Default Value
Save Type	State
State Save To	Register 1
Screen Save To	SCREEN000.png
DISP:ENABle	ON
Full Screen	Off
SCPI Telnet	ON
SCPI Socket	ON
SICL Server	ON
Softkey Language	English
System Annotation	ON
Display Theme	TDColor
System IDN Response	Factory result of *IDN?
System IDN Response selection	Factory

Confirmation is required to restore the factory default values. The confirmation dialog is:

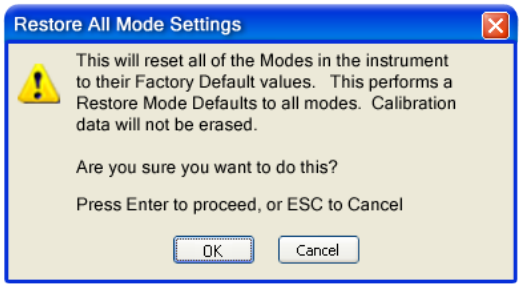


Key Path	System, Restore System Defaults
Example	:SYST:DEF MISC
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	x.14.50

Restore Mode Defaults (All Modes)

This selection resets all of the modes in the instrument back to their default state just as a Restore Mode Defaults does and it switches the instrument to the power-on mode and causes the default measurement for the power-on mode to be active. This level of Restore System Defaults does not affect any system settings, but it does affect the state of all modes and does cause a mode switch unless the instrument was already in the power-on mode.

Confirmation is required to restore the factory default values. The confirmation dialog is:

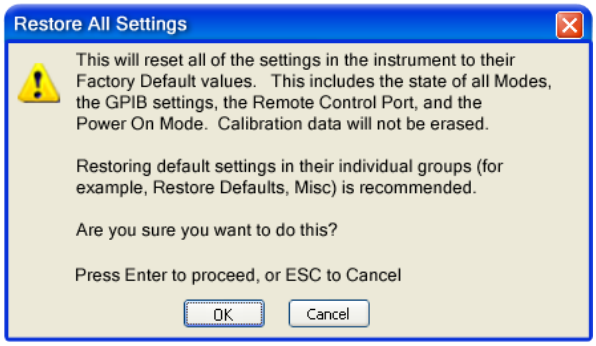


Key Path	System, Restore System Defaults
Example	:SYST:DEF MOD
Couplings	An All Mode will cause the currently running measurement to be aborted, mode switch to the power-on mode and activate the default measurement for the power-on mode.. It gets the mode to a consistent state with all of the default couplings set.
Initial S/W Revision	Prior to A.02.00

All

This performs a comprehensive reset of ALL analyzer settings to their factory default values. It resets all of the system setting groups, causes a Restore Mode Defaults for all modes in the instrument, and switches back to the power-on mode. It does not affect the User Preset file or any user saved files.

Confirmation is required to restore the factory default values. The confirmation dialog is:



NOTE If you are using an Keysight USB External Mixer, then you will need to perform a Refresh USB Mixer Connection after Restoring All Defaults.

Key Path	System, Restore System Defaults
Example	:SYST:DEF ALL
Notes	If using Keysight USB External Mixer, perform a Refresh USB Mixer Connection (SCPI command :MIX:BAND USB) following a Restore All Defaults.
Couplings	An All will cause the currently running measurement to be aborted and get all modes to a consistent state, so it is unnecessary to couple any settings.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.14.00

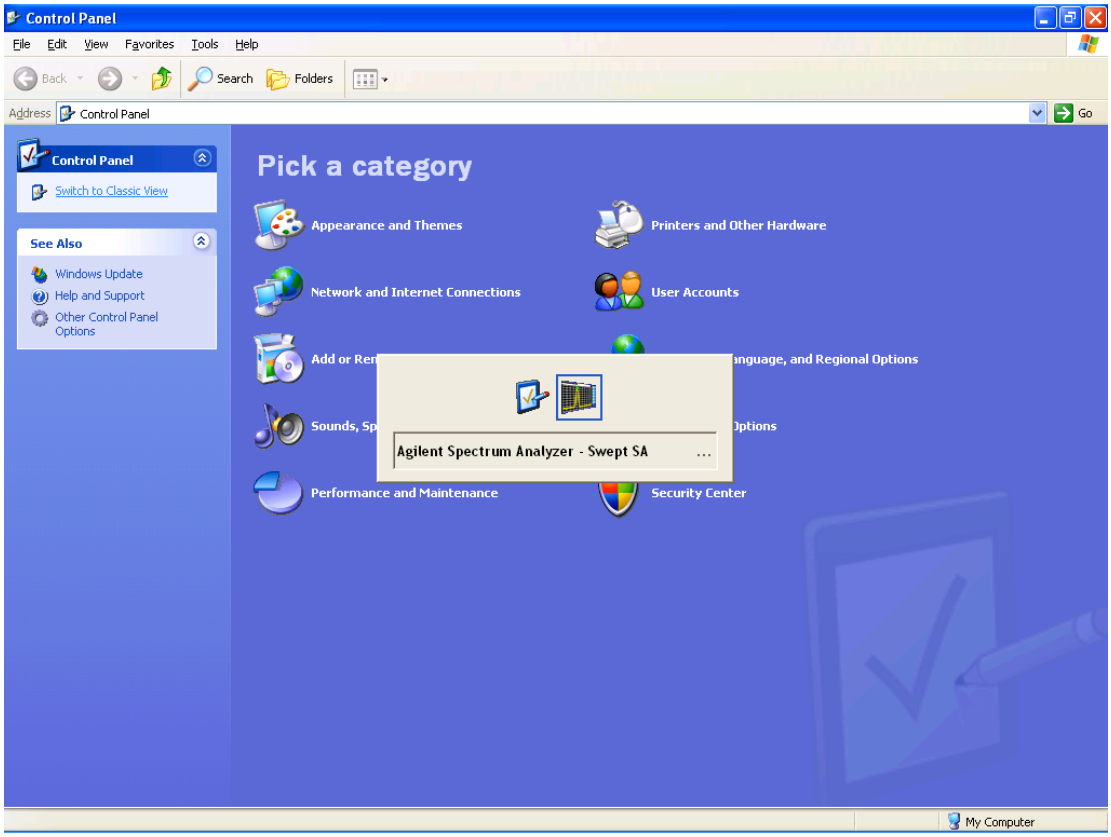
Control Panel...

Opens the Windows Control Panel. The Control Panel is used to configure certain elements of Windows that are not configured through the hardkey/softkey System menus.

NOTE This feature is not available if option SF1 is installed.

The Control Panel is a separate Windows application, so to return to the analyzer once you are in the Control Panel, you may either:

Exit the Control Panel by clicking on the red X in the upper right hand corner, with a mouse



Or use Alt-Tab: press and hold the Alt

key and press and release the Tab key until the Analyzer logo is showing in the window in the center of the screen, as above, then release the Alt key.

Key Path	System
Notes	No remote command for this key.
Initial S/W Revision	Prior to A.02.00

Licensing...

Opens the license explorer.

NOTE This feature is not available if option SF1 is installed.

For Help on this key, select Help in the menu bar at the top of the license explorer window.

Key Path	System
Notes	No equivalent remote command for this key.
Backwards Compatibility Notes	In ESA the SCPI command for displaying the Show Licenses screen is: :SYSTem:CONFigure:LKEY:STATe OFF|ON|0|1:SYSTem:CONFigure:LKEY:STATe? There are no equivalent SCPI commands in the X-Series for displaying the License Explorer.
Initial S/W Revision	Prior to A.02.00

Remote Command	`:SYSTem:LKEY <"OptionInfo">, <"LicenseInfo">`
Example	SYST:LKEY "N9073A-1FP", "027253AD27F83CDA5673A9BA5F427FDA5E4F25AEB1017638211AC9F60D9C639FE539735909C551DE0A91"
Notes	The <"OptionInfo"> contains the feature and the version. You must specify the feature but can omit the version. If you omit the version, the system regards it as the latest one, since the system knows which version is supported for each feature. The <"LicenseInfo"> contains the signature, the expiration date, and serial number for transport if transportable. You must specify the signature, but you can omit the other information. If you omit the expiration date, the system regards it as permanent. If you omit the serial number, the system regards it as non-transportable. As a result, this supports reverse compatibility.
Initial S/W Revision	Prior to A.02.00

Remote Command	`:SYSTem:LKEY:DELete <"OptionInfo">,<"LicenseInfo">`

Example	SYST:LKEY:DEL 'N9073A-1FP", "027253AD27F83CDA5673A9BA5F427FDA5E4F25AEB1017638211AC9F60D9C639FE539735909C551DE0A91"
Notes	The <"OptionInfo"> contains the feature and the version. You must specify the feature but can omit the version. If you omit the version, the system regards it as the latest one, if more than one version is installed. The <"LicenseInfo"> contains the signature, the expiration date, and whether or not be transportable. You must specify the signature, but you can omit the other information. If you omit the expiration date, the system regards it as permanent. If you omit the transportability, the system regards it as non-transportable. As a result, this supports reverse compatibility.
Initial S/W Revision	Prior to A.02.00

Remote Command	`:SYSTem:LKEY:LIST?`
Notes	Return Value: An <arbitrary block data> of all the installed instrument licenses. The format of each license is as follows. <Feature>,<Version>,<Signature>,<Expiration Date>,<Serial Number for Transport> Return Value Example: #3136 N9073A-1FP,1.000,B043920A51CA N9060A-2FP,1.000,4D1D1164BE64 N9020A-508,1.000,389BC042F920 N9073A-1F1,1.000,5D71E9BA814C,13-aug-2005 <arbitrary block data> is: #NMMM<data> Where: N is the number of digits that describes the number of MMM characters. For example if the data was 55 bytes, N would be 2. MMM would be the ASCII representation of the number of bytes. In the previous example, N would be 55. <data> ASCII contents of the data
Initial S/W Revision	Prior to A.02.00

Remote Command	`:SYSTem:LKEY? <"OptionInfo">`
Example	SYST:LKEY? "N9073A-1FP"
Notes	The <"OptionInfo"> contains the feature and the version. You must specify the feature but can omit the version. If you omit the version, the system regards it as the latest one. Return Value: <"LicenseInfo"> if the license is valid, null otherwise.

	<"LicenseInfo"> contains the signature, the expiration date, and serial number if transportable. Return Value Example: "B043920A51CA"
Initial S/W Revision	Prior to A.02.00

Remote Command	`:SYSTem:HID?`
Notes	Return value is the host ID as a string
Initial S/W Revision	Prior to A.02.00

Security

Accesses capabilities for operating the instrument in a security controlled environment.

Key Path	System
Initial S/W Revision	A.04.00

USB

The Windows operating system can be configured to disable write access to the USB ports for users who are in a secure environment where transferring data from the instrument is prohibited. This user interface is a convenient way for the customer to disable write access to USB.

Key Path	System, Security
Mode	All
Scope	Mode Global
Remote Command	`:SYSTem:SECurity:USB:WPRotect[:ENABle] ON|OFF|0|1` `:SYSTem:SECurity:USB:WPRotect[:ENABle]?`
Example	:SYST:SEC:USB:WPR ON Will set USB ports to Read-only
Notes	When the USB ports are in Read-only mode then no data can be stored to USB, including the internal USB memory used for a back-up location for the calibration data.
Dependencies	This key is grayed-out unless the current user has administrator privileges.
Preset	This is unaffected by Preset or any Restore System Defaults. An Agilent Recovery will set the USB to write protect OFF
State Saved	No
Range	Read-Write|Read only
Initial S/W Revision	A.04.00

Read-Write

Selection for allowing full read-write access to the USB ports.

Key Path	System, Security, USB	
Example	:SYST:SEC:USB:WPR OFF	Will set USB ports to Read-Write
Initial S/W Revision	A.04.00	

Read only

Selection for disabling write access to the USB ports.

Key Path	System, Security, USB	
Example	:SYST:SEC:USB:WPR ON	Will set USB ports to Read only
Initial S/W Revision	A.04.00	

Diagnostics

The Diagnostics key in the System menu gives you access to basic diagnostic capabilities of the instrument.

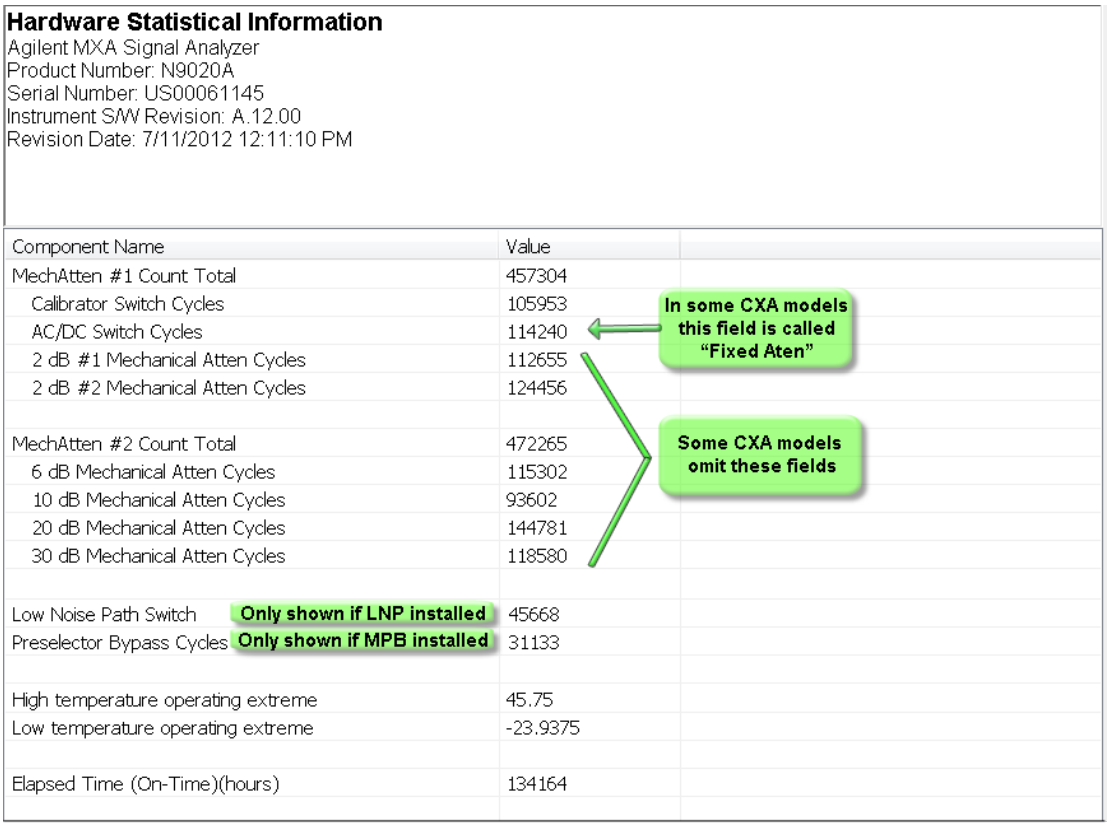
Key Path	System
Initial S/W Revision	Prior to A.02.00

Show Hardware Statistics

Provides a display of various hardware statistics. The statistics include the following:

- High and Low temperature extremes
- Elapsed time that the instrument has been powered-on (odometer)

The display should appear listing the statistics, product number, serial number, and firmware revision.



The CXA models in which the AC/DC Switch field is called Fixed Atten and that omit the mechanical attenuation fields are the N9000A–503/507 models.

Modular HWs only have time and temperature information in Show Hardware Statistics.

The data will be updated only when the Show Hardware Statistics menu key is pressed, it will not be updated while the screen is displayed.

The tabular data should be directly printable.

Key Path	System, Diagnostics
Mode	All
Notes	The values displayed on the screen are only updated upon entry to the screen and not updated while the screen is being displayed.
Initial S/W Revision	Prior to A.02.00

SCPI for Show Hardware Statistics (Remote Commands Only)

Each of the hardware statistic items can be queriedvia SCPI.

- Error! Reference source not found.
- Error! Reference source not found.
- Error! Reference source not found.

Self test

This key gives you access to diagnostic capabilities for self tests of the instrument.

Key Path	System, Diagnostics
Initial S/W Revision	Prior to A.10.00

All Self Test

This key invokes all the self tests defined in the Diagnostics Self Test section.

Key Path	System, Diagnostics, Self Test
Remote Command	`SYSTem:TEST:WCTS:[ALL]`
Example	SYST:TEST:WCTS:[ALL]
Initial S/W Revision	A.12.50

FEC Self Test

This key invokes the EXT E6607C front end control self test. When operation is complete, the generated test summary information is appended to log file E:\Agilent\Instrument\FECTestLog.txt. This test summary file can be retrieved from the instrument using the MMEM set of SCPI command, once you have the fully qualified the path and file name.

If the self test fails, the following error message will be generated:

"–330, Self-test failed, see log file E:\Agilent\Instrument\FECTestLog.txt"

If the self test passes, an advisory message "FEC self-test completed successfully" is generated.

Key Path	System, Diagnostics, Self Test
Remote Command	`SYSTem:TEST:WCTS:FEC`
Example	SYST:TEST:WCTS:FEC
Notes	Access log with command : MMEM:DATA? "E:\ Agilent\Instrument\FECTestLog.txt"
Initial S/W Revision	A.12.50

Show Result

This key gives you access to show results of the following self tests:

- Source self-test results
- E6607C embedded MPA or E6640A/E6650A RFIO self-test results
- E6607C FEC self-test results

Key Path	System, Diagnostics, Self Test
Initial S/W Revision	A.12.50

FEC Self Test Results

Provides a display of last FEC test results, the display should appear listing model number, serial number and test time at the top of display, and then list test date/time, test name, measured value, valid range and pass/fail of each FEC test item, the tabular data should be directly printable.

Key Path	System, Diagnostics, Self Test,Show Results
Remote Command	`SYSTem:TEST:WCTS:SHOW:RESult FEC`
Example	SYST:TEST:WCTS:SHOW:RES FEC
Initial S/W Revision	A.12.50

The example of FEC self test result display is as follows:

FEC Self Test Results
Produce Number: E6607C
Serial Number: MY51380437
Instrument S/W: 11/16/2012 2:51:19 PM

FpgaVersionTest					
Date	Time(GMT)	Name	MeasValue	ValidRange	Result
11/23/2012	16:13:56	Analog_FPGA	16.000	>= 16.000	Pass
11/23/2012	16:13:56	Digital_FPGA	50.000	>= 46.000	Pass
11/23/2012	16:13:56	CRFS_FPGA	38.000	>= 38.000	Pass
PowerSupplyTest					
Date	Time(GMT)	Name	MeasValue	ValidRange	Result
11/23/2012	16:13:56	ABUS_+32CHK	31.904	30.900 – 32.900	Pass
11/23/2012	16:13:56	ABUS_+12CHK	12.296	10.800 – 13.200	Pass
11/23/2012	16:13:56	+10VA	9.935	9.600 – 10.200	Pass
11/23/2012	16:13:56	+5VA	4.995	4.900 – 5.100	Pass
11/23/2012	16:13:56	+3.3VA	3.299	3.200 – 3.400	Pass
11/23/2012	16:13:56	–3.3VA	–3.311	–3.400 - – 3.200	Pass
11/23/2012	16:13:56	ACOM	0.00	–0.200 –	Pass

				0.200	
11/23/2012	16:13:56	–5VA	–5.036	–5.100 - – 4.900	Pass
11/23/2012	16:13:56	–6.1VA	–5.880	–6.200 - – 5.700	Pass
11/23/2012	16:13:56	–10VA	–10.116	–10.200 - – 9.800	Pass
11/23/2012	16:13:56	ABUS_–2.5V_REF	–2.508	–2.520 - – 2.470	Pass
11/23/2012	16:13:56	ABUS_+2.5V_REF	2.508	2.480 – 2.520	Pass
11/23/2012	16:13:56	ABUS_–10VPALC	–10.047	–10.200 - – 9.800	Pass
11/23/2012	16:13:57	ABUS_DET_MOD_FLT	18.000	7.800 – 100.000	Pass

Show FEC Self Test Results contents (Remote Command Only)

A remote command is available to obtain the contents of the Show FEC Self Test Results screen (the entire contents, not just the currently displayed page).

Remote Command	`SYSTem:TEST:WCTS:FEC:RESult?`
Example	SYST:TEST:WCTS:FEC:RES?
Notes	The output is an IEEE Block format of the Show FEC Self Test Results contents. Each line is separated with a new-line character.
Initial S/W Revision	A.12.50

	Keysight Converged	PSA
IP Address	SYSTem:COMMunicate:LAN:ADDRess <string> SYSTem:COMMunicate:LAN:ADDRess?	:SYSTem:COMMunicate:LAN[:SELF]:IP <string> :SYSTem:COMMunicate:LAN[:SELF]:IP?
Gateway	SYSTem:COMMunicate:LAN:DGATeway <string> SYSTem:COMMunicate:LAN:DGATeway?	:SYSTem:COMMunicate:LAN[:SELF]:GATEway <string :SYSTem:COMMunicate:LAN[:SELF]:GATEway?
Subnet Mask	SYSTem:COMMunicate:LAN:SMASk <string> SYSTem:COMMunicate:LAN:SMASk?	:SYSTem:COMMunicate:LAN[:SELF]:SUBNetmask <string> :SYSTem:COMMunicate:LAN[:SELF]:SUBNetmask?

Internet Explorer...

This key launches Microsoft Internet Explorer. A mouse and external keyboard are highly desired for using Internet Explorer. When Internet Explorer is running, close Internet Explorer to return focus to the Instrument Application (or use Alt-Tab).

Key Path	System
Mode	All
Notes	No equivalent remote command for this key.
Initial S/W Revision	A.05.01

7 Trigger Functions

7 Vector Analysis

The Vector Analysis measurement is accessed from the Meas hardkey. The Vector Analysis measurement bases its results on a set of periodic time samples of a channel. The channel is defined by a combined bank of hardware and DSP filters whose overall frequency response has a flat top and steep rolloff at the band edges. The time record is operated upon by a number of mathematical functions, including the FFT to produce spectrum results and statistical functions, including complementary cumulative distribution function (CCDF). Any of these results may be displayed in a flexible layout, with the Y data formatted in a variety of ways, and results scaled as desired. Many of these analysis results are also available in optional VSA demodulation measurements. For measurement results and views, see "View/Display" on page 446.

This topic contains the following sections:

"Remote Command Results for Vector Analysis Measurement" on page 238

"Front Panel Results" on page 239

Remote Command Results for Vector Analysis Measurement

The Vector Analysis measurement is invoked remotely by the following:

```
:CONFigure:VECTor
```

```
:CONFigure:VECTor:NDEFault
```

Remote results may be obtained using the following:

```
:FETCh:VECTor[n]?
```

Only table results may be obtained using FETCh. The tables available for the Vector Analysis measurement are ACP and OccBW tables, which are available to any VSA measurement.

```
:INITiate:VECTor
```

```
:READ:VECTor[n]?
```

NOTE **The MEASure? command is not supported by the Vector Analysis measurement.**

For more information and remote commands, see Remote SCPI Commands and Data Queries.

Also see Trace/Detector, Data for more measurement SCPI commands.

Front Panel Results

Vector Analysis results may be displayed in any trace, and the traces viewed in a variety of layouts that show 1, 2, 3, or 4 traces at a time. Each trace may be scaled as desired regardless of measurement settings, or auto-scaled to reflect measurement settings. Data may be formatted in a variety of ways. (For example, you may view the log magnitude of complex data, the real or imaginary part, etc.) You may use View Presets to view frequently used results, or to provide a familiar starting point from which you may customize your own view.

Key Path	Meas
Mode	VSA

Res BW

Enables you to select the resolution bandwidth of the measurement. Res BW is mathematically related to Time length and Window type, so changing one of these, directly or indirectly, must change at least one other.

Res BW and Time length are related by the following equation:

Res BW = ENBW / T

where:

ENBW is the normalized effective noise bandwidth of the Window. See FFT Window for more details).

T is the time record length.

Therefore, if you change Res BW, Main Time must also change, and vice versa. (If the Gate function is on, then it is Gate Length, not Main Time, that is related to Res BW by the above equation.)

For convenience, Res BW is by default also coupled to Span (but not vice versa). This coupling can be turned off. See "Res BW Coupling" on page 460 for more details.

Limits:

- The minimum Res Bw to Span ratio is related to the maximum Main Time length, and is given by:

  ENBW / 409600 if Freq points state parameter is set to Auto

  ENBW / (Freq Points – 1) if Freq points parameter is manually set

- The maximum Res BW to Span ratio is related to the minimum time record size (16 points for most windows, 17 points for Flat Top), and is given by:

  ENBW / 12.5

  (ENBW / 13.28125 for Flat Top window)

See "Main Time" on page 655 for more on relationships between Res BW and time.

Key Path	BW
Mode	VSA

Measurement	<meas>:=VECTor|ADEMod|IPOWer|IDEMod|MOTotalk
Remote Command	`[:SENSe]:<meas>:BANDwidth|BWIDth[:RESolution] <bandwidth>` `[:SENSe]:<meas>:BANDwidth|BWIDth[:RESolution]?`
Example	VECT:BWID 200 KHZ VECT:BWID?
Notes	Key blanked in any other measurement than Vector or Analog Demod
Couplings	Changing Main Time or Gate Length changes Res BW. See Res BW Coupling for other changes that can affect (or be affected by) Res BW
Preset	300 kHz
State Saved	Saved in instrument state.
Min	–9.9e37
Max	9.9e37
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Res BW Coupling

Enables you to control how Res BW is affected by other parameters. The three possible settings are:

Span: (default) This setting keeps the ratio of Res BW:Span constant whenever the Span is changed. However, you can change the Res BW at will, and doing so establishes a new Res BW:Span ratio.

Min: This setting is only available when the Freq Points property is manually set, and is disabled (forceful grey out) when Freq Points is Auto. It maintains the RBW at the minimum possible value given the settings for Freq Points, Span, and Window. Res BW coupling is changed from Min to Span if you manually set Res BW.

Fixed: This setting attempts to keep the Res BW setting fixed as Span, Freq Points, or FFT Window type change. Changing FFT Window causes Main Time (or Gate) length to change in order to keep the Res BW Fixed. Res BW coupling is forced to Fixed mode any time you turn the Gate function on or manually set Main Time length. See "Main Time" on page 655 for details.

If a requested change to Res BW or Time Length (Main or Gate) causes the Res BW to go outside the minimum or maximum Res BW: Span limits (see "Res BW" on page 459 for specifics), the Res BW is clipped at the appropriate limit. The Time length is then set according to the limited Res BW.

In Fixed coupling mode, if increasing the Span causes the new Res BW:Span to drop below the minimum, or if decreasing Span would cause the new Res BW:Span to exceed the maximum, the requested Span is accepted and then the Res BW is changed to the limiting value. The associated Time length is updated.

In Fixed or Span coupling, increasing Freq Points does not cause the Main (or Gate) Time Length to increase. It only adds zero padding to the array that is used in the FFT to calculate the Spectrum. Therefore, it does not affect Res BW. If decreasing Freq Points decreases the maximum time length below the current Main Time, then the Main Time length is clipped to the new limits. If Gating is on, the Gate Delay is first limited, then the Gate Length. The Res BW is then updated as a result of the Time changes.

In Fixed or Span coupling, changing the Window Type does not affect RBW unless it falls outside the limits calculated using the new window. Then the Res BW is clipped at the appropriate limit. The associated Time length is also updated.

Key Path	BW
Mode	VSA
Measurement	<meas>:=VECTor|ADEMod|IPOWer|IDEMod|MOTotalk
Remote Command	`[:SENSe]:<meas>:BANDwidth|BWIDth[:RESolution]:COUPle SPAN | MIN | FIXed` `[:SENSe]:<meas>:BANDwidth|BWIDth[:RESolution]:COUPle?`
Example	VECT:BWID:COUP FIX VECT:BWID:COUP?
Notes	Blanked when in any other measurement than Vector or Analog Demod MIN is not available if Freq Points is set to Auto and trying to set it generates error –221 Settings conflict
Couplings	See narrative above table and also "Res BW" on page 459
Preset	SPAN
State Saved	Saved in instrument state.
Range	Span | Min | Fixed
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

Key Path	Front-panel key
Remote Command	`:INITiate:CONTinuous OFF|ON|0|1` `:INITiate:CONTinuous?`
Example	:INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation
Preset	ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF)
State Saved	Saved in instrument state
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep.
Initial S/W Revision	Prior to A.02.00

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until k = N, at which point the current sequence will stop and the instrument will go to the idle state.

File

See "File" on page 176

Input/Output

See "Input/Output" on page 118

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Remote Measurement Functions

This section contains the following topics:

"Measurement Group of Commands" on page 692

"Current Measurement Query (Remote Command Only) " on page 694

"Limit Test Current Results (Remote Command Only)" on page 694

"Data Query (Remote Command Only)" on page 694

"Calculate/Compress Trace Data Query (Remote Command Only)" on page 695

"Calculate Peaks of Trace Data (Remote Command Only)" on page 700

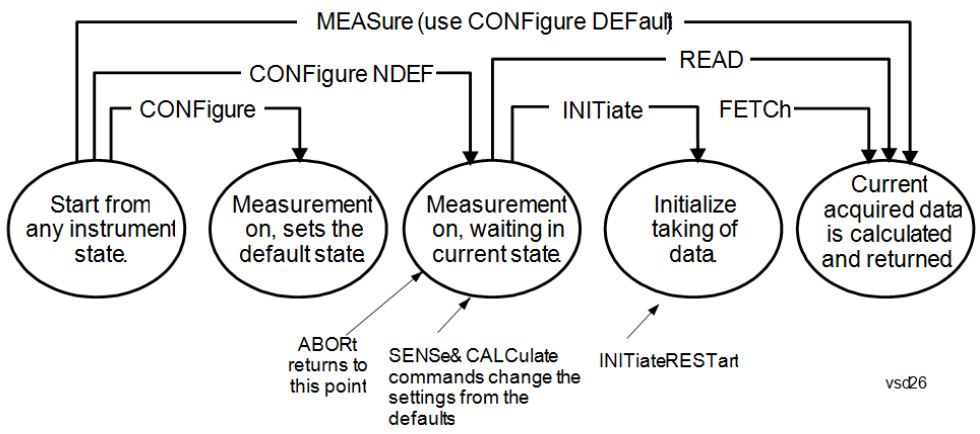
"Hardware-Accelerated Fast Power Measurement (Remote Command Only)" on page 701

"Format Data: Numeric Data (Remote Command Only)" on page 715

"Format Data: Byte Order (Remote Command Only)" on page 716

Initial S/W Revision	Prior to A.02.00

Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFigure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFigure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
- For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
- Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
- If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
- For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
- Blocks other SCPI communication, waiting until the measurement is complete before returning the results
- If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)

Initial S/W Revision	Prior to A.02.00

Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

Remote Command	`:CONFigure?`
Example	CONF?
Initial S/W Revision	Prior to A.02.00

Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

Remote Command	`:CALCulate:CLIMits:FAIL?`
Example	CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails.
Initial S/W Revision	Prior to A.02.00

Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDer and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

Remote Command	`:CALCulate:DATA[n]?`
Notes	The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCh:<measurement>? query where <measurement> is the current measurement.
Initial S/W Revision	Prior to A.02.00

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

Remote Command	`:CALCulate:DATA<n>:COMPress? BLOCk | CFIT | MAXimum | MINimum | MEAN | DMEan | RMS | RMSCubed | SAMPle | SDEViation | PPHase [,<soffset>[,<length>[,<roffset>[,<rlimit>]]]]`
Example	To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.)
Notes	The command supports 5 parameters. Note that the last 4 (<soffset>,<length>,<roffset>,<rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data.
Initial S/W Revision	Prior to A.02.00

- BLOCk or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.
-

NOTE **If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.**

Equation 1

Mean Value of Data Points for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{\text{Xi} \in \text{region(s)}} \text{Xi}$$

where Xi is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{\text{Xi} \in \text{region(s)}} |\text{Xi}|$$

where |Xi| is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$DME = 10 \times \log_{10}\left(\frac{1}{n}\sum_{Xi \in \text{region(s)}} 10^{\frac{Xi}{10}}\right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$RMS = \sqrt{\frac{1}{n}\sum_{Xi \in \text{region(s)}} Xi^2}$$

where Xi is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$RMS = \sqrt{\frac{1}{n}\sum_{Xi \in \text{region(s)}} Xi \; Xi^*}$$

where Xi is the complex value representation of an I/Q pair, Xi* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPle - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEViation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$SDEV = \sqrt{\frac{1}{n} \sum_{Xi \in region(s)} (Xi - \overline{X})^2}$$

where Xi is a data point value, X is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$SDEV = \sqrt{\frac{1}{n} \sum_{Xi \in region(s)} (|Xi| - \overline{X})^2}$$

where |Xi| is the magnitude of an I/Q pair, X is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector (n=0) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

  The rms power of the specified region may be expressed as:

  Power = 10 x log [10 x (RMS I/Q value)] + 10.

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{Xi \in region} Xi \, Xi^*}$$

where Xi is the complex value representation of an I/Q pair, Xi* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

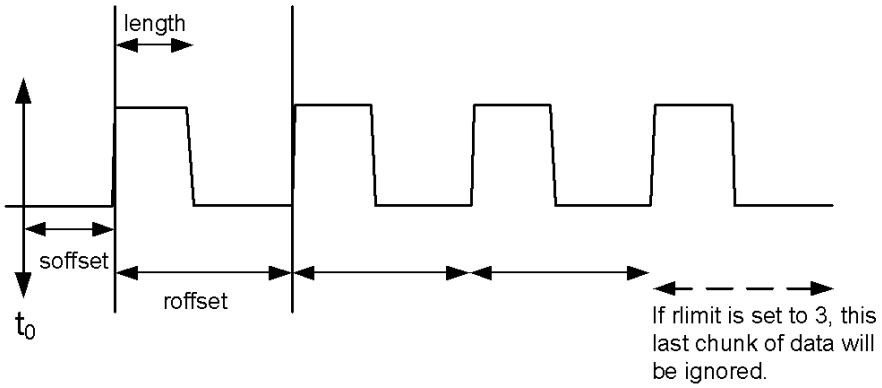
$$\frac{1}{n} \sum_{Yi \in region} Yi$$

where Yi is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

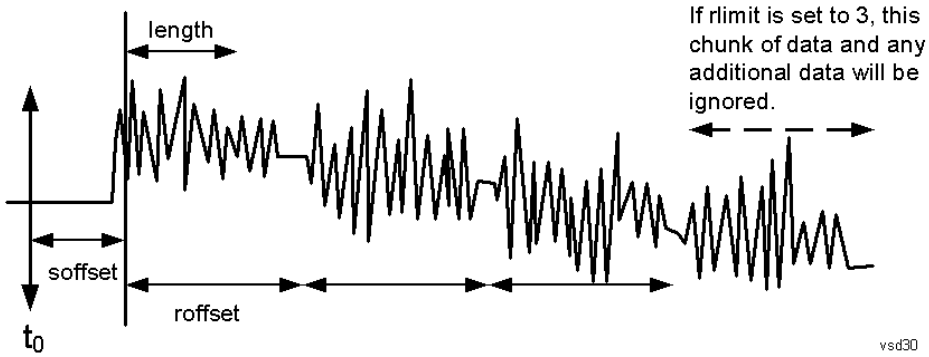
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints – 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints – 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints – 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDer and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

Remote Command	For Swept SA measurement:
	`:CALCulate:DATA[1]|2|...|6:PEAKs? <threshold>,<excursion>[,AMPLitude | FREQuency | TIME[,ALL | GTDLine | LTDLine]]`
	For most other measurements:
	`:CALCulate:DATA[1]|2|...|6:PEAKs? <threshold>,<excursion>[,AMPLitude | FREQuency | TIME]`

Example	Example for Swept SA measurement in Spectrum Analyzer Mode: CALC:DATA4:PEAK? –40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above –40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned. Query Results 1: With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time). If no peaks are found the peak list will consist of only the number of peaks, (0).
Notes	<n> - is the trace that will be used <threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as –200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu. <excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the

	excursion value stored under the Peak Criteria menu. Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL). Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reportedSorting order: AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent) FREQuency - lists the peaks in order of occurrence, left to right across the x-axis. TIME - lists the peaks in order of occurrence, left to right across the x-axis. Peaks vs. Display Line: ALL - lists all of the peaks found (default if optional parameter not sent). GTDLine (greater than display line) - lists all of the peaks found above the display line. LTDLine (less than display line) - lists all of the peaks found below the display line.
Initial S/W Revision	Prior to A.02.00

Hardware-Accelerated Fast Power Measurement (Remote Command Only)

The Fast Power option (FP2) enables very fast channel power measurements for instruments with the prerequisite hardware (DP2 and/or B40). It accomplishes this by peforming real-time overlapped FFTs at the hardware layer, using software for basic post-processing before returning the result to the user. The upshot of this approach is improved throughput for user applications that require many sequential power measurements.

The analysis bandwidth of FP2 is limited by the licenses in the instrument, but its maximum overall analysis bandwidth per acquisition is 40 MHz.

FP2 is remote-only, which means the instrument does not switch to any particular mode or measurement. FP2 commands can be sent while another application is in use on the front panel.

Each Fast Power measurement can be predefined using an array index, and up to 1,000 measurements can be stored. In the following documentation, instances of [1,2,...,999] can be substituted with a particular measurement index, e.g. CALC:FPOW:POW1?, CALC:FPOW:POW2?, CALC:FPOW:POW134?. In this way, power measurements can be defined one time in a batch, and then executed multiple times without having to redefine them, similar to “list mode” on other measurements.

In addition to basic channel power measurements, there are a number of other measurement “functions” for each channel, including peak power, peak frequency, and power spectral density. See the Function parameter for more information.

Reset Fast Power Measurement (Remote Command Only)

Resets the measurement configuration to the defaults.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:RESet`
Example	:CALC:FPOW:POW1:RES

Notes	Option FP2 is required.
Initial S/W Revision	A.14.00

Define Fast Power Measurement (Remote Command Only)

Fast Power acquisitions are configured using the DEFine command. This command accepts a comma-delimited string of configuration parameters and their appropriate values, which are all specified in the subsection below.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:DEFine "configuration string"`
Example	:CALC:FPOW:POW1:DEF "CenterFrequency=2e9, AcquisitionTime=0.005"
Notes	See below for a list of measurement variables that can be defined in the configuration string.
Initial S/W Revision	A.14.00

Acquisition Time

Example	CALC:FPOW:POW1:DEF "AcquisitionTime=0.002"
Notes	The acquisition time parameter sets the time in which the entire spectrum is measured. An increase in the acquisition time yields an improvement in measurement repeatability.
Preset	0.001 s
Range	0 s to 1 s
Default Unit	Time (s)
Initial S/W Revision	A.14.00

Center Frequency

Example	CALC:FPOW:POW1:DEF "CenterFrequency=2e9"
Notes	The center frequency parameter sets the frequency in which the measurement is centered around. The OffsetFrequency parameter is calculated relative to the center frequency.
Preset	1 GHz
Range	0 Hz to maximum instrument frequency
Default Unit	Frequency (Hz)
Initial S/W Revision	A.14.00

DC Coupled

Example	CALC:FPOW:POW1:DEF "DCCoupled=True"
Notes	The DC coupled parameter allows the user to specify whether the DC blocking capacitor is utilized. Set parameter to true when measuring frequencies below 10 MHz.
Preset	False
Range	True (DC Coupled) or False (AC Coupled)
Default Unit	Boolean
Initial S/W Revision	A.14.00

DetectorType

Example	CALC:FPOW:POW1:DEF "DetectorType=Peak"
Notes	Option FP2 is required. The detector type parameter allows the user to choose whether a RMS average or peak value is used during the measurement.
Preset	RmsAverage
Range	RmsAverage, Peak
Initial S/W Revision	A.14.00

Do Noise Correction

Example	CALC:FPOW:POW1:DEF "DoNoiseCorrection=True"
Notes	When noise correction is enabled, the linear noise power contributed by the analyzer is subtracted from all measurements. This effectively lowers the noise floor of the analyzer. When noise correction is enabled, the first measurement for a given set of input parameters will take extra time. This is because the analyzer takes an extra acquisition with the RF input disconnected from the analyzer's front end to measure the noise of just the analyzer. The measured noise floor is stored in a cache so the noise acquisition will occur only once for the same state settings. In other words, if noise correction was turned on and the analyzer made an acquisition at frequency A, then frequency B, and back again to frequency A, the hidden initial noise floor acquisition would only occur for the first acquisition at frequency A and the cached noise floor would be used the second time frequency A was measured.
Preset	False
Range	True (enable noise correction) or False (disable noise correction)
Default Unit	Boolean
Initial S/W Revision	A.14.00

Do Spur Suppression

Example	CALC:FPOW:POW1:DEF "DoSpurSuppression=True"
Notes	When measuring very low level signals, or when large out-of-band inputs are input into the analyzer, sometimes unwanted spurs and residuals can appear in the measured spectrum. Spur suppression is a method to help minimize the levels of these internally generated spurs and residuals. When spur suppression is enabled, the analyzer will automatically take two acquisitions using two different internal analog LO frequencies. The FFT spectrums from both acquisitions are combined by taking the minimum power between both traces on a per FFT bin basis. External signals will have the same amplitude for both traces and therefore will return the expected amplitudes. However, low level spurs and residuals generated internally to the analyzer tend to move to different FFT bins depending on the internal analog LO frequency used, and therefore tend to be suppressed using this spur suppression method. Because two acquisitions, rather than a single acquisition, are made when spur suppression is enabled, the measurement time will always be slower when spur suppression is enabled.
Preset	False
Range	True (enable spur suppression) or False (disable spur suppression)
Default Unit	Boolean
Initial S/W Revision	A.14.00

Electronic Attenuator Bypass

Example	CALC:FPOW:POW1:DEF "ElecAttBypass =False"
Notes	The electronic attenuation bypass parameter allows the user to either utilize or bypass the electronic attenuator. The electronic attenuator is only available for frequencies up to 3.6 GHz. Set parameter to true when using frequencies above 3.6 GHz and set the parameter to false when using the preamp.
Preset	True
Range	True (bypass electronic attenuator) or False (use electronic attenuator)
Default Unit	Boolean
Initial S/W Revision	A.14.00

Electronic Attenuation

Example	CALC:FPOW:POW1:DEF "ElecAttenuation=10"
Notes	Option EA3 is required. The electronic attenuation value parameter sets the amount of electrical attenuation from 0 to 24 dB (1 dB steps). Set "ElecAttBypass=False" to make sure the electronic attenuator path is enabled.
Preset	0 dB
Range	0 – 24 dB (1 dB steps)

Default Unit	dB
Initial S/W Revision	A.14.00

IF Gain

Example	CALC:FPOW:POW1:DEF "IFGain=10"
Notes	The IF gain parameter allows the user to specify the gain at the IF stage anywhere from –6 to 16 dB (1 dB steps). This is an advanced feature, and for most cases this should remain at its default value of 0 dB.
Preset	0 dB
Range	–6 – 16 dB (1 dB steps)
Default Unit	dB
Initial S/W Revision	A.14.00

IF Type

Example	CALC:FPOW:POW1:DEF "IFType=B25M"
Notes	The IF type parameter allows the user to select between different IF paths. For example, if the signal is less than 25 MHz wide, then the user can select the B25M path to take advantage of additional filtering on this analog IF path.
Preset	B40M
Range	B10M, B25M, B40M
Initial S/W Revision	A.14.00

Include Power Spectrum

Example	CALC:FPOW:POW1:DEF "IncludePowerSpectrum=True"
Notes	The power spectrum parameter allows the user to read data on the entire spectrum for diagnostic purposes. It is not recommended for production use. See CALC:FPOW:POW[n]:READ2? for details on the binary format of the response.
Preset	False
Range	True (return both channel power and full power spectrum) or False (returns only channel power)
Default Unit	Boolean
Initial S/W Revision	A.14.00

Mechanical Attenuation

Example	CALC:FPOW:POW1:DEF "MechAttenuation=10"
Notes	The mechanical attenuation value parameter sets the amount of mechanical attenuation anywhere from 0 to 70 dB (2 dB steps).
Preset	0 dB
Range	0 – 70 dB (2 dB steps)
Default Unit	dB
Initial S/W Revision	A.14.00

Preamp Mode

Example	CALC:FPOW:POW1:DEF "PreAmpMode=Low"
Notes	The license for the appropriate preamp is required. The preamp mode parameter specifies whether the preamps are being utilized. Low allows any preamps up to 3.6 GHz, and Full allows all licensed preamps. Set "ElecAttBypass=True" in order to utilize any preamps.
Preset	Off
Range	Off, Low, Full
Initial S/W Revision	A.14.00

Resolution Bandwidth Mode

Example	CALC:FPOW:POW1:DEF "PreAmpMode=Low"
Notes	The resolution bandwidth mode parameter allows the user to choose whether the RBW filter is automatically or manually set. The BestSpeed value minimizes measurement time, while the Narrowest value minimizes RBW size (minimum of two FFT bins per RBW). To manually specify an RBW, set this parameter to Explicit, and set the ResolutionBW parameter to the desired value.
Preset	BestSpeed
Range	BestSpeed, Narrowest, Explicit
Initial S/W Revision	A.14.00

Resolution Bandwidth

Example	CALC:FPOW:POW1:DEF "ResolutionBW=25e3"
Notes	The resolution bandwidth parameter sets the 3-dB bandwidth of the RBW filter. The ResolutionBWMode parameter must be set to Explicit in order to manually set the RBW.

Preset	0 Hz
Default Unit	Hz
Initial S/W Revision	A.14.00

Trigger Delay

Example	CALC:FPOW:POW1:DEF "TriggerDelay=0.025"
Notes	The trigger delay parameter sets the time after an external trigger is detected until the measurement is performed.
Preset	0 s
Range	0 – 1 s
Default Unit	Seconds
Initial S/W Revision	A.14.00

Trigger Level

Example	CALC:FPOW:POW1:DEF "TriggerLevel=2"
Notes	The trigger level parameter sets the voltage value at which an external trigger is detected.
Preset	1.2 V
Range	–5 to 5 V
Default Unit	Volts
Initial S/W Revision	A.14.00

Trigger Slope

Example	CALC:FPOW:POW1:DEF "TriggerSlope=Negative"
Notes	The trigger slope parameter indicates the direction of the edge trigger voltage for detection.
Preset	Positive
Range	Positive, Negative
Initial S/W Revision	A.14.00

Trigger Source

Example	CALC:FPOW:POW1:DEF "TriggerSource=Ext1"
Notes	The trigger source parameter allows the user to choose between measurement's triggering freely or controlled by an external input. Ext1 and Ext2 correspond to Trigger 1 In and Trigger 2 In, respectively.
Preset	Free
Range	Free, Ext1, Ext2
Initial S/W Revision	A.14.00

Trigger Timeout

Example	CALC:FPOW:POW1:DEF "TriggerTimeout=0.1"
Notes	The trigger timeout parameter sets the time in which the analyzer will wait for a trigger before automatically performing the measurement.
Preset	1 s
Range	0 – 1 s
Default Unit	Seconds
Initial S/W Revision	A.14.00

Signal Input

Example	CALC:FPOW:POW1:DEF "SignalInput=Fp50MHzCW"
Notes	The signal input parameter allows the user to select between using the main RF input or the internal analyzer reference CW signal of 50 MHz.
Preset	FpMainRf
Range	FpMainRf, Fp50MHzCW
Initial S/W Revision	A.14.00

Use Preselector

Example	CALC:FPOW:POW1:DEF "UsePreSelector=True"
Notes	The preselector parameter allows the user to either utilize or bypass the front end tunable filter at frequencies above 3.6 GHz. For frequencies below 3.6 GHz, the preselector is automatically bypassed, so you do not need to set this parameter to False in those cases.
Preset	False
Range	True (use preselector above 3.6 GHz), or False (preselector bypassed)

Default Unit	Boolean
Initial S/W Revision	A.14.00

Channel Bandwidth Array

Example	CALC:FPOW:POW1:DEF "Bandwidth=[3.84e6, 5e6, 3.84e6]"
Notes	The bandwidth parameter array defines the bandwidth of each channel that will be measured. All array parameters should have the same number of elements. Alternatively, if all the elements are the same value, a single number with no square brackets can be used to define the parameter.
Preset	[1e6]
Range	0 to 40 MHz
Default Unit	Hz
Initial S/W Revision	A.14.00

Channel Filter Type Array

Example	CALC:FPOW:POW1:DEF "FilterType=[RRC, IBW, RRC]"
Notes	The filter type parameter allows the user to choose between an integration bandwidth (IBW) filter or a root-raised-cosine (RRC) filter. The integration bandwidth filter weighs all frequencies within the bandwidth equally. The root-raised-cosine filter has an associated shape parameter, defined by the FilterAlpha parameter. All array parameters should have the same number of elements. Alternatively, if all the elements are the same value, a single value with no square brackets can be used to define the parameter.
Preset	[IBW]
Range	IBW, RRC
Initial S/W Revision	A.14.00

Channel Filter Alpha Array

Example	CALC:FPOW:POW1:DEF "FilterAlpha=[0.5, 0.0, 0.5]"
Notes	The filter alpha parameter allows the user to adjust the alpha value associated with the root-raised-cosine (RRC) filter type. Set FilterType to RRC in order to utilize this parameter. All array parameters should have the same number of elements. Alternatively, if all the elements are the same value, a single number with no square brackets can be used to define the parameter.
Preset	[0.22]
Range	0.0 – 1.0
Initial S/W Revision	A.14.00

Channel Measurement Function Array

Example	CALC:FPOW:POW1:DEF "Function=[BandPower, PeakPower, BandPower]"
Notes	This parameter array defines what measurement is being made for each individually-specified channel: BandPower: Total power within the specified bandwidth of the channel (dBm) BandDensity: Total power density within the specified bandwidth of the channel (dBm/Hz) PeakPower: The peak power value within the specified bandwidth of the channel (dBm) PeakFrequency: The frequency which corresponds to the peak power value within the specified bandwidth of the channel. This frequency is relative to the center frequency (Hz) XdBBandwidth: The half power (–3.01 dB) bandwidth of the highest amplitude signal that resides within the channel (Hz), dB is configurable using XdBBandwidth parameter OccupiedBandwidth: The bandwidth at which 99% of the total power resides within the channel (Hz), percentage configurable using OccupiedBandwidthPercent parameter All array parameters should have the same number of elements. Alternatively, if all the elements are the same value, a single value with no square brackets can be used to define the parameter.
Preset	[BandPower]
Range	BandPower, BandDensity, PeakPower, PeakFrequency, XdBBandwidth, OccupiedBandwidth
Initial S/W Revision	A.14.00

Channel Offset Frequency Array

Example	CALC:FPOW:POW1:DEF "OffsetFrequency=[–5e6, 0, 5e6]"
Notes	The offset frequency parameter array defines the difference between the center frequency to the center frequency of each channel. All array parameters should have the same number of elements.
Preset	[0]
Range	0 to 20 MHz
Default Unit	Hz
Initial S/W Revision	A.14.00

Channel Occupied Bandwidth Percent Array

Example	CALC:FPOW:POW1:DEF "OccupiedBandwidthPercent =[0.95, 0.95, 0.95]"
Notes	This parameter only applies for channels whose Function is set to OccupiedBandwidth. The occupied bandwidth percent parameter specifies the percent of total power in these channels. The valid range for this parameter is 0.0 to 1.0, where 1.0 represents 100%. The default for this parameter is 0.99, which will return the bandwidth that contains 99% of the total channel power.

Preset	[0.99]
Range	0 – 1.0
Initial S/W Revision	A.14.00

Channel x-dB Bandwidth Array

Example	CALC:FPOW:POW1:DEF " XdBBandwidth =[–6.02, –3.01, –1.0]"
Notes	This parameter only applies for channels whose Function is set to XdBBandwidth. The X dB bandwidth parameter is used to specify the power relative to the peak channel power over which the bandwidth is calculated. The parameter value must be a negative number.
Preset	[–3.01]
Range	–200 to 0 dB
Default Unit	dB
Initial S/W Revision	A.14.00

Define Fast Power Measurement Query (Remote Command Only)

The DEFine? command is used to retrieve a list of all defined parameters in an ASCII string format

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:DEFine?`
Exam	:CALC:FPOW:POW1:DEF?

p l e	
N o t e s	This command query is used to retrieve a list of all defined parameters in an ASCII format. The following is an example of the returned results: "DCCoupled=False,ElecAttBypass=True,ElecAttenuation=0,IFGain=0,MechAttenuation=0,PreAmpMode=Off,PreSelectorOffset=0,UsePreSelector=False,ExternalReferenceFrequency=10000000,FrequencyReferenceSource=AutoExternalFrequencyReference,IFType=B40M,LOMode=SLW,SignalInput=FpMainRf,AcquisitionTime=0.001,CenterFrequency=1000000000,ResolutionBW=0,ResolutionBWMode=BestSpeed,DetectorType=RmsAverage,Bandwidth=[1000000],OffsetFrequency=[0],Function=[BandPower],FilterType=[IBW],FilterAlpha=[0.22],OccupiedBandwidthPercent=[0.99],XdBBandwidth=[-3.01],DoNoiseCorrection=False,DoSpurSuppression=False,MeasurementMethod=HardwareFFT,IncludePowerSpectrum=False,TriggerDelay=0,TriggerLevel=1.2,TriggerSlope=Positive,TriggerSource=Free,TriggerTimeout=1"
I n i t i a l S / W R e v i s i o n	A.14.00

Configure Fast Power Measurement (Remote Command Only)

The configure command begins hardware setup and returns immediately, with no acquisition made. This can be used in parallel with other hardware operations to effectively hide the hardware setup time.

	Mode	All
	Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:CONFigure`
	Example	:CALC:FPOW:POW1:CONF
	Notes	Option FP2 is required.
	Initial S/W Revision	A.14.00

Initiate Fast Power Measurement (Remote Command Only)

The INITiate command begins an acquisition and returns immediately. The results of the measurement can be retrieved using FETCh.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:INITiate`
Example	:CALC:FPOW:POW1:INIT
Notes	Option FP2 is required.
Initial S/W Revision	A.14.00

Fetch Fast Power Measurement (Remote Command Only)

The FETCh command query is used to retrieve the results of an acquisition initiated by the INIT command. The returned results are in ASCII string format. The string begins and ends with quotation marks.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:FETCh?`
Example	:CALC:FPOW:POW1:FETC?
Notes	Option FP2 is required. Returns m comma-separated ASCII values, where m corresponds to the number of bandwidths defined. 1. Declared function return in the 1st specified channel 2. Declared function return in the 2nd specified channel ... m. Declared function return in the last specified channel The INIT and FETC? command sequence performs the same functionality of a single CALC:FPOW:POW[n]? query. Units of the returned values are dependent on the Function parameter for each channel.
Initial S/W Revision	A.14.00

Execute Fast Power Measurement (Remote Command Only)

This command query is used as shorthand for an INIT command immediately followed by a FETC? command. The returned results are in ASCII string format. The string begins and ends with quotation marks.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]?`
Example	:CALC:FPOW:POW1?
Notes	Option FP2 is required. See notes for Fast Power Fetch for return format.
Initial S/W Revision	A.14.00

Binary Read Fast Power Measurement (Remote Command Only)

This command query is used as shorthand for an INIT command immediately followed by a FETC? command. The returned results are in a binary format.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:READ?` `:CALCulate:FPOWer:POWer[1,2,…,999]:READ1?`
Example	:CALC:FPOW:POW1:READ? :CALC:FPOW:POW1:READ1?
Notes	Option FP2 is required. Returns m 4 byte floating point binary values (Little-Endian), where m corresponds to the number of bandwidths defined.
Initial S/W Revision	A.14.00

Diagnostic Binary Read Fast Power Measurement (Remote Command Only)

This command query is used as shorthand for an INIT command immediately followed by a FETC? command. The returned results are in a binary format. This command is used primarily for diagnostic purposes to test for ADC overloads and to visibly inspect the spectrum.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:READ2?`
Example	:CALC:FPOW:POW1:READ2?
Notes	Option FP2 is required. Note: Spectrum data is only returned if the IncludePowerSpectrum parameter is set to True. If IncludePowerSpectrum is False, the number of spectrum points will be zero (0). Units of the returned values are dependent on the Function parameter per channel (e.g. dBm for BandPower, Hz for PeakFrequency). Returns binary data (Little-Endian) that contains information on m amount of channels, along with ADC over range and full spectrum data. The following is the binary format of the response. Bandwidth Return Value 1. Number of channels specified, m [4 byte int] 2. Declared function result for the 1st specified channel [4 byte float] 3. Declared function result for the 2nd specified channel [4 byte float] ... (m + 1). Declared function result for the last (mth) specified channel [4 byte float] ADC Over Range 1. ADC over-range occurred (1: true, 0: false) [2 byte short]

	Spectrum Data 1. Number of points in the spectrum data, k [4 byte int] 2. Start frequency of spectrum data (Hz) [8 byte double] 3. Step frequency of spectrum data (Hz) [8 byte double] 4. FFT bin at 1st point (dBm) [4 byte float] 5. FFT bin at 2nd point (dBm) [4 byte float] ... (k + 3). FFT bin at last (kth) point (dBm) [4 byte float]
Initial S/W Revision	A.14.00

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command	`:FORMat[:TRACe][:DATA] ASCii|INTeger,32|REAL,32 |REAL,64` `:FORMat[:TRACe][:DATA]?`
Notes	The query response is: ASCii: ASC,8 REAL,32: REAL,32 REAL,64: REAL,64 INTeger,32: INT,32 When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm). The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.
Dependencies	Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL). Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message –161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message –121 "Invalid Character in Number".
Preset	ASCii
Backwards Compatibility Notes	Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.
Initial S/W Revision	Prior to A.02.00

The specs for each output type follow:

ASCii - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

Remote Command	`:FORMat:BORDer NORMal|SWAPped` `:FORMat:BORDer?`
Preset	NORMal
Initial S/W Revision	Prior to A.02.00

Meas Preset

Immediately sets all measurement parameters to their Preset values.

Key Path	Meas Setup
Mode	VSA
Remote Command	`:CONFigure:VECTor`
Example	CONF:VECT

Mode

See "Mode" on page 152

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings
- See "How-To Preset" on page 274 for more information.

Key Path	Front-panel key
Remote Command	`:SYSTem:PRESet`
Example	:SYST:PRES
Notes	*RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0.
Couplings	A Mode Preset aborts the currently running measurement, activates the default measurement, and. gets the mode to a consistent state with all of the default couplings set.
Backwards Compatibility Notes	In the X-Series, the legacy “Factory Preset” has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no “Preset Type” as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using

	User Preset.
Initial S/W Revision	Prior to A.02.00

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

Type Of Preset	SCPI Command	Front Panel Access
Auto Couple	:COUPle ALL	Auto Couple front-panel key
Meas Preset	:CONFigure:<Measurement>	Meas Setup Menu
Mode Preset	:SYSTem:PRESet	Mode Preset (green key)
Restore Mode Defaults	:INSTrument:DEFault	Mode Setup Menu
Restore All Mode Defaults	:SYSTem:DEFault MODes	System Menu; Restore System Default Menu
*RST	*RST	not possible (Mode Preset with Single)
Restore Input/Output Defaults	:SYSTem:DEFault INPut	System Menu; Restore System Default Menu
Restore Power On Defaults	:SYSTem:DEFault PON	System Menu; Restore System Default Menu
Restore Alignment Defaults	:SYSTem:DEFault ALIGn	System Menu; Restore System Default Menu
Restore Miscellaneous Defaults	:SYSTem:DEFault MISC	System Menu; Restore System Default Menu
Restore All System Defaults	:SYSTem:DEFault [ALL] :SYSTem:PRESet:PERSistent	System Menu; Restore System Default Menu
User Preset	:SYSTem:PRESet:USER	User Preset Menu
User Preset All Modes	:SYSTem:PRESet:USER:ALL	User Preset Menu

Power On Mode Preset	:SYSTem:PON:TYPE MODE	System Menu
Power On User Preset	:SYSTem:PON:TYPE USER	System Menu
Power On Last State	:SYSTem:PON:TYPE LAST	System Menu

Mode Setup

See "Mode Setup" on page 171

Print

See "Print" on page 181

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

Type	Default Prefix	Menu
State	State_	(Save/Recall)
Trace + State	State_	(Save/Recall)
Screen	Screen_	(Save/Recall)
Amplitude Corrections	Ampcor_	(Import/Export)
Traces	Trace_	(Import/Export)
Limit Lines	LLine_	(Import/Export)
Measurement Result	MeasR_	(Import/Export)
Capture Buffer	CapBuf_	(Import/Export)

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file.The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as “fred.csv”, then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

.

NOTE If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

Key Path	Front-panel key
Notes	No remote command for this key specifically.
Initial S/W Revision	Prior to A.02.00

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are States andTraces. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

NOTE In products that run multiple instances of the X-Series Application, all instances share the same register and file location where you want to recall from.

The default paths for Recall are data type dependent and are the same as for the Save key.

Key Path	Front-panel key
Notes	No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATe <filename>. If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.
Backwards Compatibility Notes	In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data. In the X-Series, “state” always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.
Backwards Compatibility Notes	Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn’t support and it will limit the recalled setting to what it allows. Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can’t be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible. It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user. Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.
Initial S/W Revision	Prior to A.02.00

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or "Recalled State Register <register number>" is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See "More Information" on page 282.

Key Path	Recall
Mode	All
Remote Command	`:MMEMory:LOAD:STATe <filename>`
Example	:MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path
Example	MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state.
Notes	When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled. • If there is a mismatch between file version or model number or instrument version or model number, the recall functiontries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number. After recalling the state, the Recall State function does the following: • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0.

	• Executes a *CLS If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu.
Backwards Compatibility SCPI	`:MMEMory:LOAD:STATe 1,<filename>` For backwards compatibility, the above syntax is supported. The "1" is simply ignored.
Initial S/W Revision	Prior to A.02.00

More Information

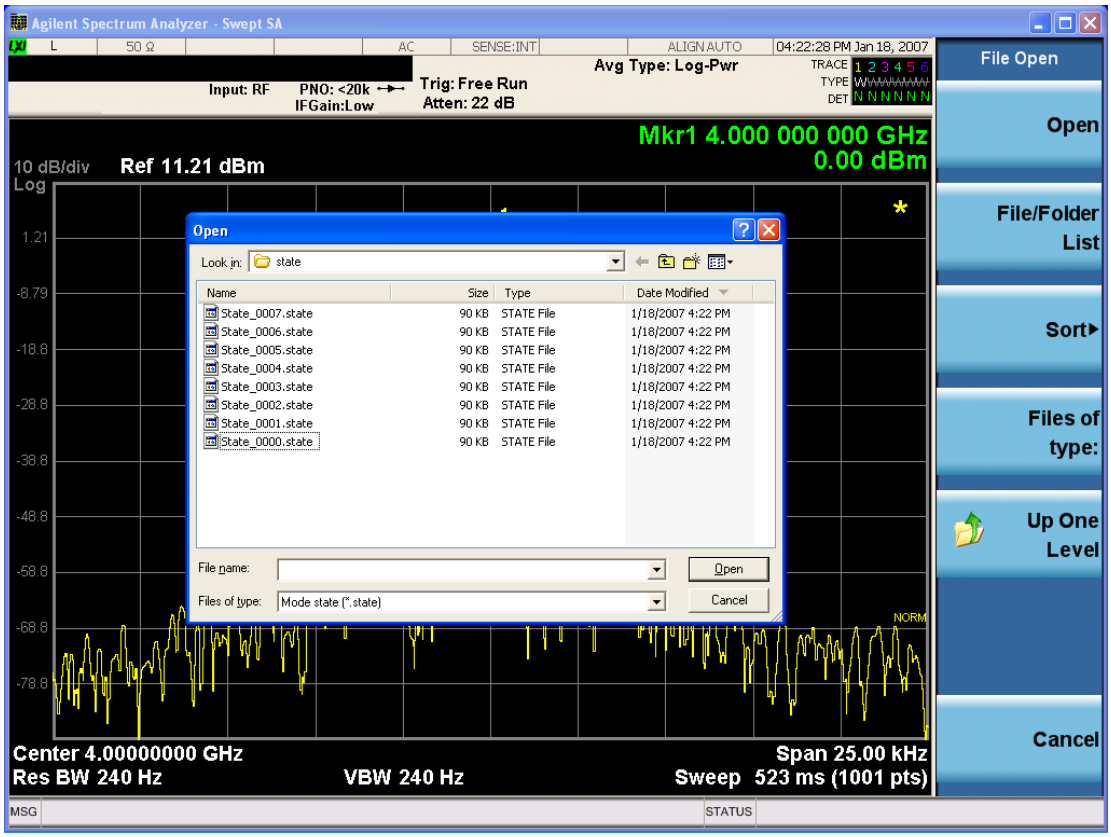
In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible,and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

The following table describes the Trace Save and Recall possibilities:

You want to recall state and one trace's data, leaving other traces unaffected.	Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed.	On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed.
You want to recall all traces	Save Trace+State from ALL traces.	On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved)
You want all traces to load exactly as they were when saved.	Save State	On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating willhave their data immediately overwritten.

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The Look In field first uses the last path from the Save As dialog Save In: path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current Open request to be cancelled. The ESC key does the same thing.

Key Path	Recall, State
Notes	Brings up the Open dialog for recalling a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

Key Path	Recall, State
Mode	All
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221,"Settings conflict;Option not available"
Initial S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

NOTE In products that run multiple instances of the X-Series Application, recalling the same register name on each instance is a way to share setups between the instances.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)" if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

NOTE In products that run multiple instances of the X-Series Application, recalling the same register name on each instance is a way to share setups between the instances.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)" if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Sequences

These keys allow you to import a Tab separated or .txt file that will automatically setup all the parameters required for building a Sequence. The parameters will automatically be loaded into the Stated Sequencer.

Once selected, in order to import the selected Sequence Type you must select the Open key in the Source Sequence menu.

Key Path	Recall, Sequences
Mode	All
Remote Command	`:MMEMory:LOAD:SEQuences: | SLISt | ALISt | SAAList | "MySequence.txt"`
Example	:MMEM:LOAD:SEQ:SLIS "MySequence.txt"
Notes	Available file types are: –CSV (Comma delimited) (*.csv) –Text (Tab delimited) (*.txt)
Initial S/W Revision	A.05.00

Source Sequence

The list of parameters, that configure steps, that makes up a sequence for the Source.

The Source sequence is a sequence of flexible configurable steps that can be set anywhere in the instruments frequency range.

Key Path	Recall,Sequences

Example	:MMEM:LOAD:SEQ:SLIS "MySequence.txt"
Dependencies	Only available in XOBT
Initial S/W Revision	A.05.00

Open...

When you press “Open”, the analyzer brings up a Windows dialog and a menu entitled “File Open.” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "From File..." on page 748in Recall, State, for a full description of this dialog and menu.

Key Path	Recall, Data
Notes	The key location is mode-dependent and will vary. Brings up Open dialog for recalling a <mode specific> Save Type
Initial S/W Revision	Prior to A.02.00

Open...

When you press “Open”, the analyzer brings up a Windows dialog and a menu entitled “File Open.” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "From File..." on page 748in Recall, State, for a full description of this dialog and menu.

Key Path	Recall, Data
Notes	The key location is mode-dependent and will vary. Brings up Open dialog for recalling a <mode specific> Save Type
Initial S/W Revision	Prior to A.02.00

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMediate
- Sending the remote command INIT:RESTart

See "More Information" on page 288

Key Path	Front-panel key
Remote Command	`:INITiate[:IMMediate]` `:INITiate:RESTart`
Example	:INIT:IMM :INIT:REST
Notes	:INITiate:RESTart and :INITiate:IMMediate perform exactly the same function.
Couplings	Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement.
Status Bits/OPC dependencies	This is an Overlapped command. The STATus:OPERation register bits 0 through 8 are cleared. The STATus:QUEStionable register bit 9 (INTegrity sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set.
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTart command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTart command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTart command restart every measurement, which includes all traces and numeric results. There is no change to this operation.
Initial S/W Revision	Prior to A.02.00

More Information

The Restart function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when Restart is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average**, **Max Hold**, or **Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are States, Traces, and Screen Images. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

Key Path	Front-panel key
Mode	All
Notes	No remote command for this key specifically, but the :MMEM:STORe command is available for specific file types. An example is :MMEM:STOR:STATe <filename>.
Initial S/W Revision	Prior to A.02.00

State

The Save State menu lets you choose a register or file for saving the state.

NOTE In products that run multiple instances of the X-Series Application, all instances share the same register and file location where you want to save the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<mode name>\state

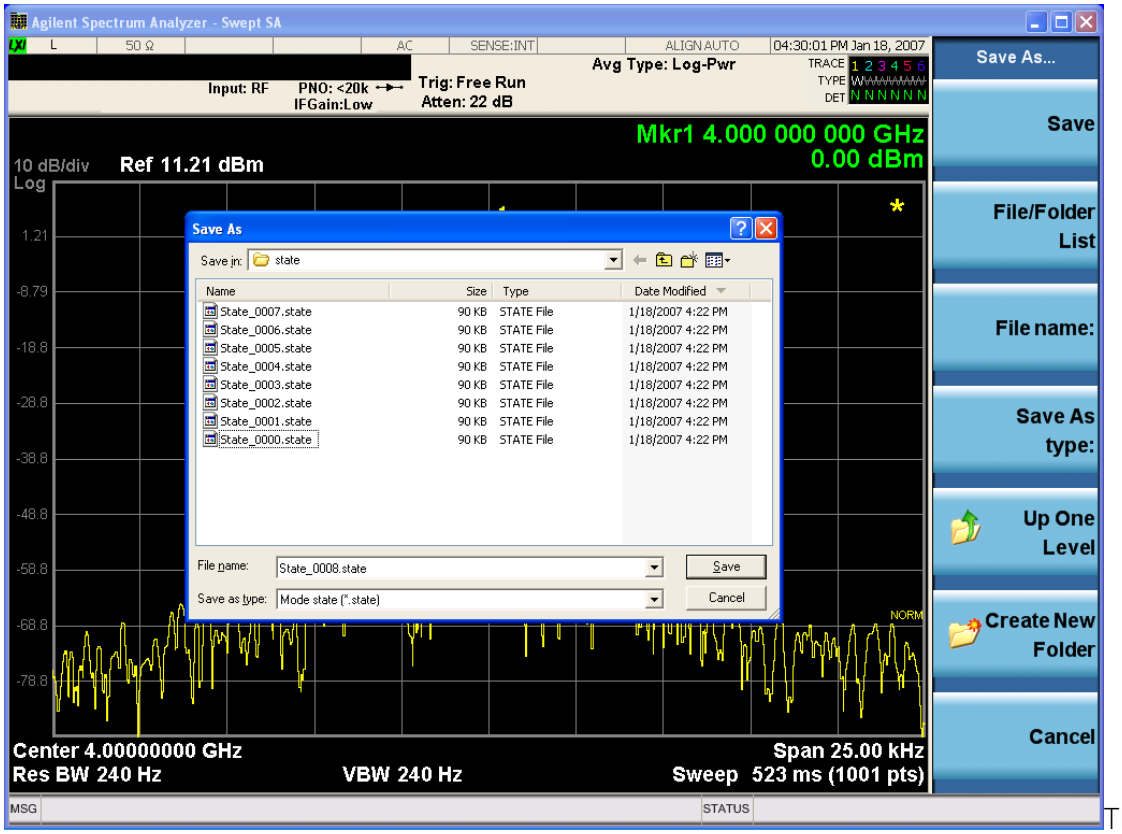
where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save
Mode	All
Remote Command	`:MMEMory:STORe:STATe <filename>`
Example	MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory.
Notes	Both single and double quotes are supported for any filename parameter over remote.

	After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.
Backwards Compatibility SCPI	`:MMEMory:STORe:STATe 1,<filename>` For backwards compatibility, the above syntax is supported. The "1" is simply ignored. The command is sequential.
Initial S/W Revision	Prior to A.02.00

To File . . .

When you press "To File", the analyzer brings up a Windows dialog and a menu entitled "Save As." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK,

the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The Save In field defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the "Quick Save " on page 744 documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor.Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the File Open dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name New Folder and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current Save As request to be cancelled. The ESC key does the same thing.

Key Path	Save, State
Mode	All
Notes	Brings up Save As dialog for saving a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See "More Information" on page 293

Key Path	Save, State
Mode	All
Remote Command	`:MMEMory:REGister:STATe:LABel <reg number>,"label"` `:MMEMory:REGister:STATe:LABel? <reg number>`
Example	:MMEM:REG:STAT:LAB 1,"my label"
Notes	<reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, –222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, –150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,""
Dependencies	N9060A–7FP or N9060B–2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, –221,"Settings conflict;Option not available"
Preset	The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc"
Initial S/W Revision	A.11.00

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name.Another

consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

NOTE **In products that run multiple instances of the X-Series Application, save with different register name if you do not want to overwrite the register of another running instance.**

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)" if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at

what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

NOTE In products that run multiple instances of the X-Series Application, save with different register name if you do not want to overwrite the register of another running instance.

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After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)" if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Mass Storage Catalog (Remote Command Only)

Key path	SCPI Only
Remote Command	`:MMEMory:CATalog? [<directory_name>]`
Notes	The string must be a valid logical path. Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format: <numeric_value>,<numeric_value>,{<file_entry>} It returns two numeric parameters and as many strings as there are files and directories. The first parameter indicates the total amount of storage currently used in bytes. The second parameter indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list: <file_name>,<file_type>,<file_size> As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty
Initial S/W Revision	Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	`:MMEMory:CDIRectory [<directory_name>]` `:MMEMory:CDIRectory?`
Notes	The string must be a valid logical path. Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value. At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal. Query returns full path of the default directory.
Initial S/W Revision	Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Key path	SCPI Only
Remote Command	`:MMEMory:COPY <string>,<string>[,<string>,<string>]`
Notes	The string must be a valid logical path. Copies an existing file to a new file or an existing directory to a new directory. Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination. The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists. This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

Key path	SCPI Only
Remote Command	`:MMEMory:COPY:DEVice <source_string>,<dest_string>`
Notes	The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device. Valid device keywords are: SNS (smart noise source) An error is generated if the file or device is not found.

Mass Storage Delete (Remote Command Only)

Key path	SCPI Only
Remote Command	`:MMEMory:DELete <file_name>[,<directory_name>]`
Notes	The string must be a valid logical path. Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an "access denied" error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

Key path	SCPI Only
Remote Command	`:MMEMory:DATA <file_name>, <data>` `:MMEMory:DATA? <file_name>`
Notes	The string must be a valid logical path. The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data. The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format.
Initial S/W Revision	Prior to A.02.00

Mass Storage Make Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	`:MMEMory:MDIRectory <directory_name>`
Notes	The string must be a valid logical path. Creates a new directory. The <directory_name> parameter specifies the name to be created. This command will generate an "access denied" error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Move (Remote Command Only)

Key path	SCPI Only
Remote Command	`:MMEMory:MOVE <string>,<string>[,<string>,<string>]`
Notes	The string must be a valid logical path. Moves an existing file to a new file or an existing directory to a new directory.

	Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination. The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists. This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Remove Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	`:MMEMory:RDIRectory <directory_name>`
Notes	The string must be a valid logical path. Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed. This command will generate an "access denied" error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Sequences

These keys allow you to save a Tab separated or CSV file of the setup parameters required to build a Sequence.

In order to save you must select the Save As button and choose a destination folder.

Key Path	Save, Sequences
Mode	All
Remote Command	`:MMEM:STOR:SEQuences: | SLISt | ALISt | SAAList | SSTep "MySequence.txt"`
Example	:MMEM:STOR:SEQ:SLISt "MySequence.txt"
Notes	Available file types are: –CSV (Comma delimited) (*.csv) –Text (Tab delimited) (*.txt)
Initial S/W Revision	A.05.00

Source Sequence

The list of parameters, that configure steps, that makes up a sequence for the Source.

The Source sequence is a sequence of flexible configurable steps that can be set anywhere in the instruments frequency range.

Key Path	Save, Sequences
Example	:MMEM:STOR:SEQ:SLIS "MySequence.txt"
Dependencies	Only available in XOBT
Initial S/W Revision	A.05.00

Save As . . .

This menu lets you select the location where you can save the Sequence. This menu is a standard Windows® dialog with Save As menu keys. The "File Name" field in the Save As dialog is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name softkey. See the Quick Save key documentation for more on the automatic file naming algorithm.

The default path for all Sequence Files is:

My Documents\Sequences

Key Path	Save, Sequences
Mode	All
Notes	Brings up Save As dialog for saving a Sequence Save Type
Initial S/W Revision	A.05.00

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows youto export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

Key Path	Save
Mode	All

Notes	The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands.
Dependencies	If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it.
Preset	Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults
Readback	The data type that is currently selected
Initial S/W Revision	Prior to A.02.00

Save As . . .

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “Save As.” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "To File . . ." on page 757 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\<mode name>\data\traces

For all of the Limit Data Files:

My Documents\<mode name>\data\limits

For all of the Measurement Results Data Files:

My Documents\<mode name>\data\<measurement name>\results

For all of the Capture Buffer Data Files:

My Documents\<mode name>\data\captureBuffer

Key Path	Save, Data
Mode	All
Notes	The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <mode specific> Save Type. The save is performed immediately and does not wait until the measurement is complete.
Initial S/W Revision	Prior to A.02.00

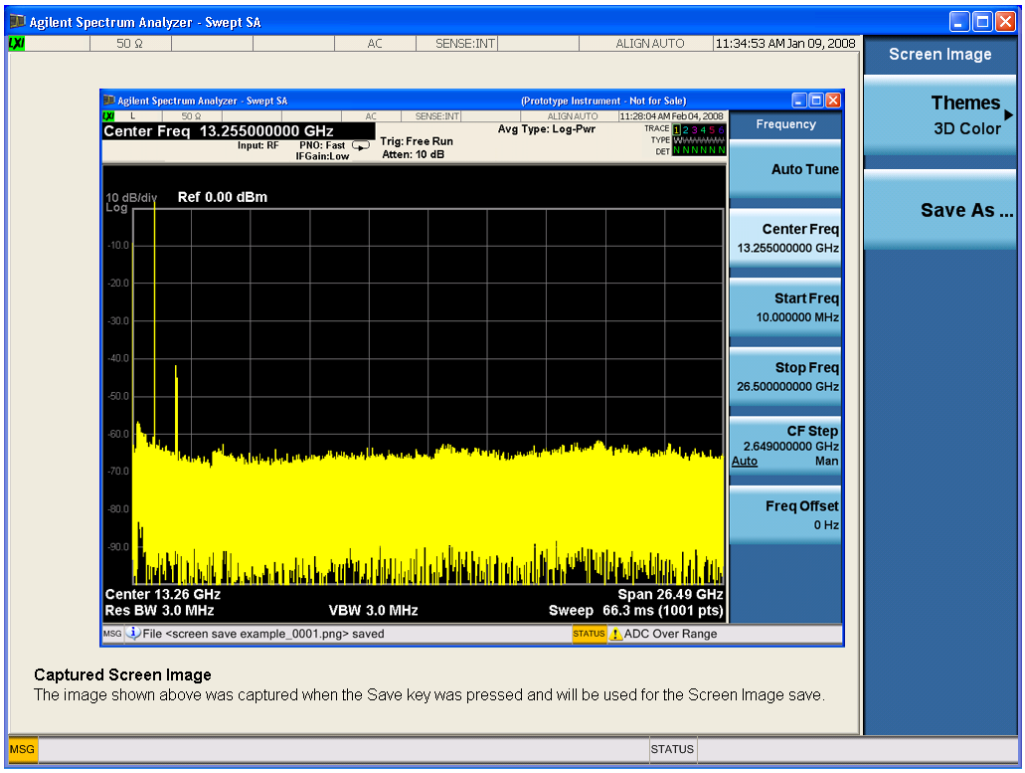
Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen

Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menus. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

Key Path	Save
Mode	All
Remote Command	`:MMEMory:STORe:SCReen <filename>`
Example	:MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The Themes option is the same as the Themes option under the Display and Page Setup dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	`:MMEMory:STORe:SCReen:THEMe TDColor | TDMonochrome | FCOLor | FMONochrome` `:MMEMory:STORe:SCReen:THEMe?`
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color | 3D Mono | Flat Color | Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Save As...

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “Save As.” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "To File . . ." on page 757 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\<mode name>\screen.

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save, Screen Image
Notes	Brings up Save As dialog for saving a Screen Image Save Type
Initial S/W Revision	Prior to A.02.00

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See "More Information" on page 304

Key Path	Front-panel key
Example	:INIT:CONT OFF
Notes	See Cont key description.
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold. For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state. INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORt. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.
Initial S/W Revision	Prior to A.02.00

More Information

See "Restart" on page 754 for details on the INIT:IMMediate (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMediate does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while Average/Hold Number is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

Opens a menu of keys that access various source configuration menus and settings. In the test set, pressing this key also causes the central view area to change and display the Source Control Main view.

Key Path	Front-panel key

RF Output

This parameter sets the source RF power output state.

Key Path	Source
Remote Command	`:OUTPut[:EXTernal][:STATe] ON|OFF|1|0` `:OUTPut[:EXTernal][:STATe]?`
Example	OUTP OFF OUTP?
Notes	The EXTernal node is shown in RD text so the SCPI remains the same between internal and external source control. However, for EXT we do not wish to document this node to the customer since we are controlling the internal source rather than the external source. This setting is for the independent mode and has no effect on the "List Sequencer" on page 850. If the "Sequencer" on page 851 is set to ON, the list sequencer controls the source output and this key will be grayed-out. And this setting will be none-forceful grey out on front panel to indicate out-of-scope. Non-forceful means user still can change this setting by SCPI but cannot change on front panel. When set to OFF will make source leave list sequencer and this setting will be black out and take effect immediately. When the RF Output is ON, an “RF” annunciator is displayed in the system settings panel. When the RF Output is turned Off, the RF annunciator is cleared. If the "Sequencer" on page 851 is set to ON, the “RF” annunciator will be replaced by “SEQ” in the system settings panel, indicating that the output is controlled by the list sequencer.
Preset	Off
Range	On | Off
Initial S/W Revision	A.05.00

Amplitude

Allows you to access the Amplitude sub-menu.

Key Path	Source
Notes	The sub-menu under this button is for independent mode and has no effect on "List Sequencer" on page 850. If the "Sequencer" on page 851 is set to ON, the list sequencer controls the source output and this key will be grayed-out on front panel to indicate out-of-scope. When you set "Sequencer" on page 851 to Off will make source leave list sequencer and this button will be black out.
Initial S/W Revision	A.05.00

RF Power

Allows you to adjust the power level of the source using the numeric keypad, step keys, or RPG. Pressing any digit, 0 through 9, on the numeric keypad brings up the unit terminator.

Please refer to the "RF Power Range " on page 307 table below for the valid ranges.

Key Path	Source, Amplitude
Remote Command	`:SOURce:POWer[:LEVel][:IMMediate][:AMPLitude] <ampl>` `:SOURce:POWer[:LEVel][:IMMediate][:AMPLitude]?`
Example	:SOUR:POW –100 dBm
Notes	Amplitude corrections can be specified for use with the source. In the event of amplitude corrections being applied, the valid ranges for the RF power do not change dependant on the current amplitude correction setting. If the combination of RF power + amplitude correction is higher or lower than the source output range, the Source Unleveled bit is set and the “Source Unleveled” indicator will appear on status panel to indicate that the source cannot maintain the output power that has been requested. When signal generator is unable to maintain the requested output level, the “Source Unleveled” indicator will appear on status panel. When the source output setting is restored to the normal range, the “Source Unleveled” is removed from status panel. Internal source has list sequence mode, which comprises of several steps which contain separate output power, frequency and waveform etc. When the source list sequence playing is complete, the last step keeps playing, and user can use this command to change the list sequence last step’s output power. The multiport adapter RFIO TX ports and GPS ports cannot ensure power accuracy when power setting is lower than –130dBm, this power setting value is defined by the sum of RF Power setting and related amplitude correction value. But user settable value could be lower than this limit. When application detected there exists power setting lower than –130dBm on MPA RFIO TX ports, then popup warning message . When application detected there exists power setting lower than –130dBm on MPA GPS ports, then popup warning message . This is only warning message, and check is performed when RF is ON.
Notes	The Min and Max value here defined UI settable amplitude range. This range is larger than actual amplitude range with level accuracy defined in spec.
Dependencies	The RF power is dependent on the RF output port and frequency, such that the current frequency and selected output port determine the valid range of power values.
Preset	–100 dBm
Min	The range of values depends on the current frequency and selected RF output port. Please refer to the "RF Power Range " on page 307 table below for the valid ranges.
Max	The range of values depends on the current frequency and selected RF output port. Please refer to the "RF Power Range " on page 307 table below for the valid ranges.
Initial S/W Revision	A.05.00

RF Power Range

RF Output Port	Frequency Range	Min Output Power	Max Output Power
High Power RF Out	10 MHz ≤ f ≤ 6 GHz	–150 dBm	20 dBm
RFIO 1 & RFIO 2	10 MHz ≤ f ≤ 6 GHz	–150 dBm	0 dBm
GPS (Note2)	10 MHz ≤ f ≤ 6 GHz	–150 dBm	0 dBm

Note: This is the UI power range, it's larger than actual spec.

Note2: GPS port is on the multiport adapter, or E6607C which has embedded MPA.

Set Reference Power

This key allows you to set the power reference. Pressing this key turns the power reference state to ON, sets the reference power value to the current RF output power, maintains this power at the RF output, and sets the displayed power to 0.00 dB. All subsequent RF power values entered under Source>Amplitude>RF Power are interpreted as being relative to this reference power.

When you use a power reference, the signal generator outputs an RF power that is set relative to the reference power by the value entered under Source>Amplitude>RF Power as follows:

Output power = reference power – entered power

Where:

reference power equals the original RF Power entered under Source>Amplitude>RF Power and set as the reference power

entered power equals a new value entered under Source>Amplitude>Amptd Offset

In addition, the displayed power value is the same as a new value entered under Source>Amplitude>RF Power.

NOTE If Power Ref is set to ON with a reference value set, entering a value under Source>Amplitude>RF Power and pressing Set Reference Power will add that value to the existing Power Ref value.

If you wish to change the reference power value to a new value entered under Source>Amplitude>RF Power, first you must set Power Ref to OFF and then press Set Reference Power.

Key Path	Source, Amplitude
Dependencies	This key is unavailable, and is grayed out when the "List Sequencer" on page 850 is turned ON.
Initial S/W Revision	A.05.00

Power Ref

This key allows you to toggle the state of the power reference.

When you use a power reference, the signal generator outputs an RF power that is set relative to the reference power by the value entered under Source>Amplitude>RF Power as follows:

Output power = reference power + entered power

Where:

reference power equals the original RF Power entered under Source>Amplitude>RF Power and set as the reference power

entered power equals a new value entered under Source>Amplitude>Amptd Offset

For more information on Reference Frequency refer to "Set Reference Power " on page 773

Key Path	Source, Amplitude

Remote Command	`:SOURce:POWer:REFerence <ampl>`
	`:SOURce:POWer:REFerence?`
	`:SOURce:POWer:REFerence:STATe OFF|ON|0|1`
	`:SOURce:POWer:REFerence:STATe?`

Example	:SOUR:POW:REF 0.00 dBm :SOUR:POW:REF:STATe ON
Dependencies	This setting is unavailable and is grayed out when the "List Sequencer" on page 850 is turned ON.
Couplings	This value is coupled to the "Set Reference Power " on page 773 key such that pressing the Set Reference Power key updates the reference power with the current output power.
Preset	0.00 dBm OFF
Min	–125.00 dBm
Max	10.00 dBm
Initial S/W Revision	A.05.00

Amptd Offset

Allows you to specify the RF output power offset value.

When the amplitude offset is set to zero (0) and you set a new offset value (positive or negative), the displayed amplitude value will change as follows and the RF output power will not change:

Displayed value = output power + offset value

Where:

output power equals the original RF Power entered under Source>Amplitude>RF Power

offset value equals the value entered under Source>Amplitude>Amptd Offset

When the amplitude offset is set to a value other than zero (0) and you enter a new RF power value under Source>Amplitude>RF Power, the displayed power will be the same as the value entered and the RF output power will be equal to the value entered minus the offset value as follows:

Output power = entered power – offset power

Displayed Power = output power + offset power

Displayed power = entered power

Where:

entered power equals the amplitude entered under Source>Amplitude>RF Power

offset power equals the value previously entered and set under Source>Amplitude>Amptd Offset

Key Path	Source, Amplitude
Remote Command	`:SOURce:POWer[:LEVel][:IMMediate]:OFFSet <rel_ampl>` `:SOURce:POWer[:LEVel][:IMMediate]:OFFSet?`
Example	:SOUR:POW:OFFS 0.00 dB
Dependencies	This setting is unavailable, and is grayed out when the List Sequencer is turned ON.
Preset	0.00 dB
Min	–200.00 dB
Max	200.00 dB
Initial S/W Revision	A.05.00

Modulation

Allows you to toggle the state of the modulation.

Key Path	Source
Remote Command	`:OUTPut:MODulation[:STATe] ON|OFF|1|0` `:OUTPut:MODulation[:STATe]?`
Example	:OUTP:MOD OFF
Notes	This setting is for independent mode and has no effect on "List Sequencer" on page 850. If the "Sequencer" on page 851 is set to ON, the list sequencer controls the source output and this key will be grayed-out. And this setting will be none-forceful grey out on front panel to indicate out-of-scope. Non-forceful means user still can change this setting by SCPI but cannot change manually on front panel. When setto Off will make source leave list sequencer and this setting will be black out and take effect immediately When the Modulation is ON, the “MOD” annunciator is displayed in the system settings panel. When the Modulation is turned Off, the “MOD” annunciator is cleared. If the "Sequencer" on page 851 is set to ON, the “MOD” annunciator will be replaced by “SEQ” in the system settings panel indicating that the output is controlled by list sequencer.
Preset	Off
Range	On | Off
Initial S/W Revision	A.05.00

Frequency

Allows you to access the Frequency sub-menu.

Key Path	Source
Notes	The sub-menu under this button is for independent mode and has no effect on "List Sequencer" on

	page 850. If the "Sequencer" on page 851 is set to ON, the list sequencer controls the source output and this key will be grayed-out. And this button will be grey out on front panel to indicate out-of-scope. When setto Off will make source leave list sequencer and this button will be black out.
Initial S/W Revision	A.05.00

Frequency

Allows you to set the RF Output Frequency. You can adjust the frequency of the source using the numeric keypad, step keys, or RPG. Pressing any digit, 0 through 9, on the numeric keypad brings up the unit terminator.

Key Path	Source, Frequency
Remote Command	`:SOURce:FREQuency[:CW] <freq>` `:SOURce:FREQuency[:CW]?`
Example	:SOUR:FREQ 1.00 GHz
Notes	Internal source has list sequence mode, which comprises of several steps which contain separate output power, frequency and waveform etc. When the source list sequence playing is complete, the last step keeps playing, and user can use this command to change the list sequence last step's output frequency.
Couplings	The frequency value is coupled to the current channel band and number, such that updates to the band and number will update the frequency value to the corresponding absolute frequency.
Preset	1.00 GHz If license F1A or 5WC is present, the default Center Frequency should be 2.412GHz.
Min	10.00 MHz
Max	Hardware Dependant: Option 503 = 3.6 GHz Option 504 = 3.8 GHz Option 506 = 6.00 GHz For E6640A, if license 5WC is present,the frequency range should be limited to: 1.1GHz–1.7GHz, 2.4GHz–2.5GHz, 4.8GHz–6.0GHz. If the user-defined frequency is outside of range, UI will report an error message called "Settings conflict; Frequency is outside available range".
Initial S/W Revision	A.05.00

Channel

The frequency of the source can be specified by a channel number of a given frequency band. This key allows you to specify the current channel number. For the appropriate range of channel numbers for a given frequency band, refer to the following tables: "GSM/EDGE Channel Number Ranges" on page 311, "W-CDMA Channel Number Ranges" on page 312, "CDMA 2000 / 1xEVDO Channel Number Ranges" on page 313, and "LTE FDD Channel Number Ranges" on page 315.

Key Path	Source, Frequency
Remote Command	`:SOURce:FREQuency:CHANnels:NUMBer <int>` `:SOURce:FREQuency:CHANnels:NUMBer?`
Example	:SOUR:FREQ:CHAN:NUMB 1
Notes	This key is grayed out when the "Radio Standard" on page 785 is set to NONE. This key is grayed out on E6630A.
Dependencies	This key is grayed out when the "Radio Standard" on page 785 is set to NONE. This key is grayed out on E6630A.
Couplings	The channel number is coupled to the frequency value when the "Radio Standard" on page 785 is not set to NONE. When the frequency value is changed, the channel number will increase or decrease to match the new frequency. If the frequency is not at an exact match for a channel number, the nearest channel number is displayed along with a greater than or less than sign to indicate the frequency is above or below the channel number.
Preset	1
Min	Please refer to the tables below for the valid ranges.
Max	Please refer to the tables below for the valid ranges.
Initial S/W Revision	A.05.00

GSM/EDGE Channel Number Ranges

Band	Link (Device)	Range	Frequency (MHz)
P-GSM	Uplink (MS)	$1 \le n \le 124$	890.0 + 0.2*n
	Downlink (BS)	$1 \le n \le 124$	935.0 + 0.2*n
E-GSM	Uplink (MS)	$0 \le n \le 124$	890.0 + 0.2*n
		$975 \le n \le 1023$	890.0 + 0.2*(n–1024)
	Downlink (BS)	$0 \le n \le 124$	935.0 + 0.2*n
		$975 \le n \le 1023$	935.0 + 0.2*(n–1024)
DCS 1800	Uplink (MS)	$512 \le n \le 885$	1710.200 + 0.20*(n–512)
	Downlink (BS)	$512 \le n \le 885$	1805.200 + 0.20*(n–512)
PCS 1900	Uplink (MS)	$512 \le n \le 810$	1850.200 + 0.2*(n–512)
	Downlink (BS)	$512 \le n \le 810$	1930.200 + 0.2*(n–512)
R-GSM	Uplink (MS)	$0 \le n \le 124$	890.0 + 0.2*n
		$955 \le n \le 1023$	890.0 + 0.2*(n–1024)
	Downlink (BS)	$0 \le n \le 124$	935.0 + 0.2*n
		$955 \le n \le 1023$	935.0 + 0.2*(n–1024)
GSM 450	Uplink (MS)	$256 \le n \le 293$	450.6 + 0.2*(n–259)
	Downlink (BS)	$256 \le n \le 293$	460.6 + 0.2*(n–259)
GSM 480	Uplink (MS)	$306 \le n \le 340$	479.000 + 0.20*(n–306)

Band	Link (Device)	Range	Frequency (MHz)
	Downlink (BS)	306 ≤ n ≤ 340	489.000 + 0.20*(n–306)
GSM 850	Uplink (MS)	128 ≤ n ≤ 251	824.200 + 0.20*(n–128)
	Downlink (BS)	128 ≤ n ≤ 251	869.200 + 0.20*(n–128)
GSM 700	Uplink (MS)	438 ≤ n ≤ 516	777.200 + 0.20*(n–438)
	Downlink (BS)	438 ≤ n ≤ 516	747.200 + 0.20*(n–438)
T-GSM810	Uplink (MS)	350 ≤ n ≤ 425	806.0 + 0.20*(n–350)
	Downlink (BS)	350 ≤ n ≤ 425	851.0 + 0.20*(n–350)

W-CDMA Channel Number Ranges

Band	Link (Device)	Range	Frequency (MHz)
Band I	Downlink	10562 ≤ n ≤ 10838	n÷5
	Uplink	9612 ≤ n ≤ 9888	n÷5
Band II	Downlink	412 ≤ n ≤ 687	n÷5 + 1850.1
		9662 ≤ n ≤ 9938	n÷5
	Uplink	12 ≤ n ≤ 287	n÷5 + 1850.1
		350 ≤ n ≤ 425	n÷5
Band III	Downlink	1162 ≤ n ≤ 1513	n÷5 + 1575
	Uplink	937 ≤ n ≤ 1288	n÷5 + 1525
Band IV	Downlink	537 ≤ n ≤ 1738	n÷5 + 1805
		1887 ≤ n ≤ 2087	n÷5 + 1735.1
	Uplink	1312 ≤ n ≤ 1513	n÷5 + 1450
		1662 ≤ n ≤ 1862	n÷5 + 1380.1
Band V	Downlink	1007 ≤ n ≤ 1087	n÷5 + 670.1
		4357 ≤ n ≤ 4458	n÷5
	Uplink	782 ≤ n ≤ 862	n÷5 + 670.1
		4132 ≤ n ≤ 4233	n÷5
Band VI	Downlink	1037 ≤ n ≤ 1062	n÷5 + 670.1
		4387 ≤ n ≤ 4413	n÷5
	Uplink	812 ≤ n ≤ 837	n÷5 + 670.1
		4162 ≤ n ≤ 4188	n÷5
Band VII	Downlink	2237 ≤ n ≤ 2563	n÷5 + 2175
		2587 ≤ n ≤ 2912	n÷5 + 2105.1
	Uplink	2012 ≤ n ≤ 2338	n÷5 + 2100
		2362 ≤ n ≤ 2687	n÷5 + 2030.1
Band VIII	Downlink	2937 ≤ n ≤ 3088	n÷5 + 340
	Uplink	2712 ≤ n ≤ 2863	n÷5 + 340

Band	Link (Device)	Range	Frequency (MHz)
Band IX	Downlink	9237 ≤ n ≤ 9387	n÷5
	Uplink	8762 ≤ n ≤ 8912	n÷5
Band X	Downlink	3112 ≤ n ≤ 3388	n÷5 + 1490
		3412 ≤ n ≤ 3687	n÷5 + 1430.1
	Uplink	2887 ≤ n ≤ 3163	n÷5 + 1135
		3187 ≤ n ≤ 3462	n÷5 + 1075.1
Band XI	Downlink	3712 ≤ n ≤ 3812	n÷5 + 736
	Uplink	3487 ≤ n ≤ 3587	n÷5 + 733
Band XII	Downlink	3837 ≤ n ≤ 3903	n÷5 – 37
		3927 ≤ n ≤ 3992	n÷5 – 54.9
	Uplink	3612 ≤ n ≤ 3678	n÷5 – 22
		3702 ≤ n ≤ 3767	n÷5 – 39.9
Band XIII	Downlink	4017 ≤ n ≤ 4043	n÷5 – 55
		4067 ≤ n ≤ 4092	n÷5 – 64.9
	Uplink	3792 ≤ n ≤ 3818	n÷5 + 21
		3702 ≤ n ≤ 3767	n÷5 – 39.9
Band XIV	Downlink	4117 ≤ n ≤ 4143	n÷5 – 63
		4167 ≤ n ≤ 4192	n÷5 – 72.9
	Uplink	3892 ≤ n ≤ 3918	n÷5 + 12
		3942 ≤ n ≤ 3967	n÷5 + 2.1
Band XIX	Downlink	712 ≤ n ≤ 763	n÷5 + 735
		787 ≤ n ≤ 837	n÷5 + 720.1
	Uplink	312 ≤ n ≤ 363	n÷5 + 770
		387 ≤ n ≤ 437	n÷5 + 755.1

CDMA 2000 / 1xEVDO Channel Number Ranges

Band	Link (Device)	Range	Frequency (MHz)
US Cellular	Uplink (MS, reverse link)	1 ≤ N ≤ 799	0.030×N+ 825.000
		991 ≤ N ≤ 1023	0.030× (N–1023) + 825.000
		1024 ≤ N ≤ 1323	0.030× (N–1024) + 815.040
	Downlink (BS, forward link)	1 ≤ N ≤ 799	0.030*N+ 870.000
		991 ≤ N ≤ 1023	0.030×(N–1023) + 870.000
		1024 ≤ N ≤ 1323	0.030×(N–1024) + 860.040
US PCS	Uplink (MS, reverse link)	0 ≤ N ≤ 1199	1850.000 + 0.050×N
	Downlink (BS, forward link)	0 ≤ N ≤ 1199	1930.000 + 0.050×N

Band	Link (Device)	Range	Frequency (MHz)
Japan Cellular Band	Uplink (MS, reverse link)	1 ≤ N ≤ 799	0.0125×(N+ 915.000
		801 ≤ N ≤ 1039	0.0125×(N–800)+ 898.000
		1041 ≤ N ≤ 1199	0.0125×(N–1040)+ 887.000
		1201 ≤ N ≤ 1600	0.0125×(N–1200)+ 893.000
	Downlink (BS, forward link)	1 ≤ N ≤ 799	0.0125×(N+ 860.000
		801 ≤ N ≤ 1039	0.0125×(N–800)+ 843.000
		1041 ≤ N ≤ 1199	0.0125×(N–1040)+ 832.000
		1201 ≤ N ≤ 1600	0.0125×(N–1200)+ 838.000
Korean PCS Band	Uplink (MS, reverse link)	0 ≤ N ≤ 599	0.050×N+ 1750.000
	Downlink (BS, forward link)	0 ≤ N ≤ 599	0.050×N+ 1840.000
NMT–450 Band	Uplink (MS, reverse link)	1 ≤ N ≤ 400	0.025×(N–1)+ 450.000
		472 ≤ N ≤ 871	0.025×(N–472)+ 410.000
		1039 ≤ N ≤ 1473	0.020×(N–1024)+ 451.010
		1536 ≤ N ≤ 1715	0.025×(N–1536)+ 479.000
		1792 ≤ N ≤ 2016	0.020×(N–1792)+ 479.000
	Downlink (BS, forward link)	1 ≤ N ≤ 400	0.025×(N–1)+ 460.000
		472 ≤ N ≤ 871	0.025×(N–472)+ 420.000
		1039 ≤ N ≤ 1473	0.020×(N–1024)+ 461.010
		1536 ≤ N ≤ 1715	0.025×(N–1536)+ 489.000
		1792 ≤ N ≤ 2016	0.020×(N–1792)+ 489.000
IMT–2000 Band	Uplink (MS, reverse link)	0 ≤ N ≤ 1199	1920.000 + 0.050×N
	Downlink (BS, forward link)	0 ≤ N ≤ 1199	2100.000 + 0.050×N
Upper 700 MHz Band	Uplink (MS, reverse link)	0 ≤ N ≤ 240	776.000 + 0.050×N
	Downlink (BS, forward link)	0 ≤ N ≤ 240	746.000 + 0.050×N
Secondary 800 MHz Band	Uplink (MS, reverse link)	0 ≤ N ≤ 719	0.025×N+ 806.000
		720 ≤ N ≤ 919	0.025×(N–720) + 896.000
	Downlink (BS, forward link)	0 ≤ N ≤ 719	0.025×N+ 851.000
		720 ≤ N ≤ 919	0.025×(N–720) + 935.000
2.5 GHz IMT Extension	Uplink (MS, reverse link)	0 ≤ N ≤ 1399	2500.000 + 0.050×N
	Downlink (BS, forward link)	0 ≤ N ≤ 1399	2620.000 + 0.050×N
US PCS 1.9 GHz	Uplink (MS, reverse link)	0 ≤ N ≤ 1299	1850.000 + 0.050×N

Band	Link (Device)	Range	Frequency (MHz)
	Downlink (BS, forward link)	0 ≤ N ≤ 1299	1930.000 + 0.050×N
AWS	Uplink (MS, reverse link)	0 ≤ N ≤ 899	1710.000 + 0.050×N
	Downlink (BS, forward link)	0 ≤ N ≤ 899	2100.000 + 0.050×N
US 2.5 GHz	Uplink (MS, reverse link)	140 ≤ N ≤ 1459	2495.000 + 0.050×N
	Downlink (BS, forward link)	140 ≤ N ≤ 1459	2617.000 + 0.050×N
700 Public Safety	Uplink (MS, reverse link)	0 ≤ N ≤ 240	787.000 + 0.050×N
	Downlink (BS, forward link)	0 ≤ N ≤ 240	757.000 + 0.050×N
C2K Lower 700	Uplink (MS, reverse link)	0 ≤ N ≤ 360	698.000 + 0.050×N
	Downlink (BS, forward link)	0 ≤ N ≤ 360	728.000 + 0.050×N
400 Euro PAMR	Uplink (MS, reverse link) Uplink (MS, reverse link) Uplink (MS, reverse link)	1 ≤ N ≤ 400 472 ≤ N ≤ 871 1536 ≤ N ≤ 1715	0.025×(N–1)+ 450.000 0.025×(N–472)+ 410.000 0.025×(N–1536)+ 479.000
	Downlink (BS, forward link) Downlink (BS, forward link) Downlink (BS, forward link)	1 ≤ N ≤ 400 472 ≤ N ≤ 871 1536 ≤ N ≤ 1715	0.025×(N–1)+ 460.000 0.025×(N–472)+ 420.000 0.025×(N–1536)+ 489.000
800 PAMR	Uplink (MS, reverse link)	0 ≤ N ≤ 239	870.0125 + 0.025×N
	Downlink (BS, forward link)	0 ≤ N ≤ 239	915.0125 + 0.025×N

LTE FDD Channel Number Ranges

The carrier frequency in the uplink and downlink is designated by the E-UTRA Absolute Radio Frequency Channel Number (EARFCN) in the range 0 – 65535. The relation between EARFCN and the carrier frequency in MHz for the downlink is given by the following equation, where FDL_low and NOffs-DL are given in table 5.4.4–1 and NDL is the downlink EARFCN.

FDL = FDL_low + 0.1(NDL – NOffs-DL)

The relation between EARFCN and the carrier frequency in MHz for the uplink is given by the following equation where FUL_low and NOffs-UL are given in table 5.4.4–1 and NUL is the uplink EARFCN.

FUL = FUL_low + 0.1(NUL – NOffs-UL)

Band	**Downlink**	**Uplink**				
FDL_low (**MHz**)	**N**Offs-DL	**Range of N**DL	**F**UL_low (**MHz**)	**N**Offs-UL	**Range of N**UL	
1	2110	0	0 – 599	1920	18000	18000 – 18599
2	1930	600	600 – 1199	1850	18600	18600 – 19199
3	1805	1200	1200 – 1949	1710	19200	19200 – 19949
4	2110	1950	1950 – 2399	1710	19950	19950 – 20399
5	869	2400	2400 – 2649	824	20400	20400 – 20649
6	875	2650	2650 – 2749	830	20650	20650 – 20749
7	2620	2750	2750 – 3449	2500	20750	20750 – 20449
8	925	3450	3450 – 3799	880	21450	21450 – 21799
9	1844.9	3800	3800 – 4149	1749.9	21800	21800 – 22149
10	2110	4150	4150 – 4749	1710	22150	22150 – 22749
11	1475.9	4750	4750 – 4949	1427.9	22750	22750 – 22949
12	729	5010	5010 – 5179	699	23010	23010 – 23179
13	746	5180	5180 – 5279	777	23180	23180 – 23279
14	758	5280	5280 – 5379	788	23280	23280 – 23379
…						
17	734	5730	5730 – 5849	704	23730	23730 – 23849
18	860	5850	5850 – 5999	815	23850	23850 – 23999
19	875	6000	6000 – 6149	830	24000	24000 – 24149
20	791	6150	6150 – 6449	832	24150	24150 – 24449
21	1495.9	6450	6450 – 6599	1447.9	24450	24450 – 24599
…						
24	1525	7700	7700 – 8039	1626.5	25700	25700 – 26039
25	1930	8040	8040 – 8689	1850	26040	26040 – 26689
26	859	8690	8690 – 9039	814	26690	26690 – 27039
…						

Note: The channel numbers that designate carrier frequencies so close to the operating band edges that the carrier extends beyond the operating band edge shall not be used. This implies that the first 7, 15, 25, 50, 75 and 100 channel numbers at the lower operating band edge and the last 6, 14, 24, 49, 74 and 99 channel numbers at the upper operating band edge shall not be used for channel bandwidths of 1.4, 3, 5, 10, 15 and 20 MHz respectively.

LTE TDD Channel Number Ranges

The carrier frequency in the uplink and downlink is designated by the E-UTRA Absolute Radio Frequency Channel Number (EARFCN) in the range 0 – 65535. The relation between EARFCN and the carrier frequency in MHz for the downlink is given by the following equation, where FDL_low and NOffs-DL are given in table 5.4.4–1 and NDL is the downlink EARFCN.

FDL = FDL_low + 0.1(NDL – NOffs-DL)

The relation between EARFCN and the carrier frequency in MHz for the uplink is given by the following equation where FUL_low and NOffs-UL are given in table 5.4.4–1 and NUL is the uplink EARFCN.

FUL = FUL_low + 0.1(NUL – NOffs-UL)

Band	Downlink	Uplink				
FDL_low (MHz)	NOffs-DL	Range of NDL	FUL_low (MHz)	NOffs-UL	Range of NUL	
33	1900	36000	36000 –36199	1900	36000	36000 – 36199
34	2010	36200	36200 –36349	2010	36200	36200 – 36349
35	1850	36350	36350 –36949	1850	36350	36350 – 36949
36	1930	36950	36950 –37549	1930	36950	36950 – 37549
37	1910	37550	37550 –37749	1910	37550	37550 – 37749
38	2570	37750	37750 –38249	2570	37750	37750 – 38249
39	1880	38250	38250 –38649	1880	38250	38250 – 38649
40	2300	38650	38650 –39649	2300	38650	38650 – 39649
41	2496	39650	39650 – 41589	2496	39650	39650 – 41589
42	3400	41590	41590 – 43589	3400	41590	41590 – 43589
43	3600	43590	43590 – 45589	3600	43590	43590 – 45589

Note: The channel numbers that designate carrier frequencies so close to the operating band edges that the carrier extends beyond the operating band edge shall not be used. This implies that the first 7, 15, 25, 50, 75 and 100 channel numbers at the lower operating band edge and the last 6, 14, 24, 49, 74 and 99 channel numbers at the upper operating band edge shall not be used for channel bandwidths of 1.4, 3, 5, 10, 15 and 20 MHz respectively.

TDSCDMA Channel Number Ranges

1.28 Mcps TDD Option

No TX-RX frequency separation is required as Time Division Duplex (TDD) is employed. Each subframe consists of 7 main timeslots where all main timeslots (at least the first one) before the single switching point are allocated DL and all main timeslots (at least the last one) after the single switching point are allocated UL.

The nominal channel spacing is 1.6 MHz, but this can be adjusted to optimise performance in a particular deployment scenario.

The carrier frequency is designated by the UTRA absolute radio frequency channel number (UARFCN). The value of the UARFCN in the IMT2000 band is defined in the general case as follows:

Nt = 5*F 0.0 MHz ≤ F≤ 3276.6 MHz

where F is the carrier frequency in MHz

Additional channels applicable to operation in the frequency band defined in sub-clause 5.2(d) are defined via the following UARFCN definition:

Nt = 5 * (F – 2150.1 MHz)2572.5 MHz ≤ F≤ 2617.5 MHz

UARFCN

1.28 Mcps TDD Option

The following UARFCN range shall be supported for each band:

Table: UTRA Absolute Radio Frequency Channel Number 1.28 Mcps TDD Option

Frequency Band	Frequency Range	UARFCN Uplink and Downlink transmission
For operation in frequency band as defined in subclause 5.2 (a)	1900–1920 MHz	9504 to 9596
	2010–2025 MHz	10054 to 10121
For operation in frequency band as defined in subclause 5.2 (b)	1850–1910 MHz	9254 to 9546
	1930–1990 MHz	9654 to 9946
For operation in frequency band as defined in subclause 5.2 (c)	1910–1930 MHz	9554 to 9646
For operation in frequency band as defined in subclause 5.2 (d)	2570–2620 MHz	12854 to 13096
For operation in frequency band as defined in subclause 5.2 (e)	2300–2400 MHz	11504 to 11996
For operation in frequency band as defined in subclause 5.2 (f)	1880–1920 MHz	9404 to 9596

Radio Setup

Allows access to the sub-menus for selecting the radio standard and associated radio band. You can also set a frequency reference and offset.

This menu is greyed out when on E6630A. Radio band settings for GSM, cdma2000, and so on -- most of which are not actually supported in E6630A, which has three narrow frequency bands. So band settings are grayed out.

Key Path	Source, Frequency
Initial S/W Revision	A.05.00

Radio Standard

Allows access to the channel band sub-menus to select the desired radio standard. When you have selected the radio standard, you can then set an active channel band. The radio standard and the active channel band allow you to use channel numbers to set frequency automatically.

Key Path	Source, Frequency, Radio Setup
Remote Command	`:SOURce:FREQuency:CHANnels:BAND NONE | PGSM | EGSM | RGSM | DCS1800 | PCS1900 | TGSM810 | GSM450 | GSM480 | GSM700 | GSM850 | BANDI | BANDII | BANDIII | BANDIV | BANDV | BANDVI | BANDVII | BANDVIII | BANDIX | BANDX | BANDXI | BANDXII | BANDXIII | BANDXIV | BANDXIX | USCELL | USPCS | JAPAN | KOREAN | NMT | IMT2K | UPPER | SECOND | PAMR400 | PAMR800 | IMTEXT | PCS1DOT9G | AWS | US2DOT5G | PUBLIC | LOWER | BAND1 | BAND2 | BAND3 | BAND4 | BAND5 | BAND6 | BAND7 | BAND8 | BAND10 | BAND11 | BAND12 | BAND13 | BAND14 | BAND17 | BAND18 | BAND19 | BAND20 | BAND21 | BAND24 | BAND25 | BAND26 | BAND27 | BAND28 | BAND31 | BAND33 | BAND34 | BAND35 | BAND36 | BAND37 | BAND38 | BAND39 | BAND40 | BAND41 | BAND42 | BAND43 | BAND44 | BANDA | BANDB | BANDC | BANDD | BANDE | BANDF` `:SOURce:FREQuency:CHANnels:BAND?`
Example	:SOUR:FREQ:CHAN:BAND PGSM
Notes	Set this setting to “NONE” will grey out "Channel" on page 776 Channel
Initial S/W Revision	A.05.00

None

Selects no radio standard for use. When you have selected the radio standard to NONE, you cannot use channel numbers to set frequency automatically. You will need to set the frequency manually.

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.05.00

GSM/EDGE

Sets GSM/EDGE as the radio standard for use and accesses the GSM/EDGE specific channel band sub-menus.

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.05.00

P-GSM

Selects P-GSM as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND PGSM
Initial S/W Revision	A.05.00

E-GSM

Selects E-GSM as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND EGSM
Initial S/W Revision	A.05.00

R-GSM

Selects R-GSM as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND RGSM
Initial S/W Revision	A.05.00

DCS 1800

Selects DCS 1800 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND DCS1800
Initial S/W Revision	A.05.00

PCS 1900

Selects PCS 1900 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND PCS1900
Initial S/W Revision	A.05.00

GSM 450

Selects GSM 450 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND GSM450
Initial S/W Revision	A.05.00

GSM 480

Selects GSM 480 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND GSM480
Initial S/W Revision	A.05.00

GSM 850

Selects GSM 850 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND GSM850
Initial S/W Revision	A.05.00

GSM 700

Selects GSM 700 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND GSM700
Initial S/W Revision	A.05.00

T-GSM 810

Selects T-GSM 810 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND T-GSM810
Initial S/W Revision	A.05.00

WCDMA

Sets WCDMA as the radio standard for use and accesses the W-CDMA specific channel band sub-menus.

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.05.00

Band I

Selects Band I as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDI
Initial S/W Revision	A.05.00

Band II

Selects Band II as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDII
Initial S/W Revision	A.05.00

Band III

Selects Band III as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDIII
Initial S/W Revision	A.05.00

Band IV

Selects Band IV as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDIV
Initial S/W Revision	A.05.00

Band V

Selects Band V as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDV
Initial S/W Revision	A.05.00

Band VI

Selects Band VI as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDVI
Initial S/W Revision	A.05.00

Band VII

Selects Band VII as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDVII
Initial S/W Revision	A.05.00

Band VIII

Selects Band VIII as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDVIII
Initial S/W Revision	A.05.00

Band IX

Selects Band IX as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDIX
Initial S/W Revision	A.05.00

Band X

Selects Band X as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDX
Initial S/W Revision	A.05.00

Band XI

Selects Band XI as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDXI
Initial S/W Revision	A.05.00

Band XII

Selects Band XII as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDXII
Initial S/W Revision	A.05.00

Band XIII

Selects band XIII as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDXIII
Initial S/W Revision	A.05.00

Band XIV

Selects Band XIV as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDXIV
Initial S/W Revision	A.05.00

Band XIX

Selects Band XIX as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDXIX
Initial S/W Revision	A.14.50

CDMA 2000 / 1xEVDO

Sets CDMA 2000 / 1XEVDO as the radio standard for use and accesses the CDMA 2000/1xEVDO specific channel band sub-menus.

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.05.00

US CELL

Selects US Cell as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND USCELL
Initial S/W Revision	A.05.00

US PCS

Selects US PCS as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND PCS
Initial S/W Revision	A.05.00

Japan Cell

Selects Japan Cell as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND JAPAN
Initial S/W Revision	A.05.00

Korean PCS

Selects Korean PCS as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND KOREAN
Initial S/W Revision	A.05.00

NMT 450

Selects NMT 450 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO

Example	:SOUR:FREQ:CHAN:BAND NMT
Initial S/W Revision	A.05.00

IMT 2000

Selects IMT 2000 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND IMT2K
Initial S/W Revision	A.05.00

Upper 700

Selects Upper 700 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND UPPER
Initial S/W Revision	A.05.00

Secondary 800

Selects Secondary 800 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND SECOND
Initial S/W Revision	A.05.00

400 Euro PAMR

Selects 400 Euro PAMR as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND PAMR400
Initial S/W Revision	A.05.00

800 PAMR

Selects 800 PAMR as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO

Example	:SOUR:FREQ:CHAN:BAND PAMR800
Initial S/W Revision	A.05.00

2.5GHz IMT EXT

Selects 2.5 GHz IMT EXT as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND IMTEXT
Initial S/W Revision	A.05.00

US PCS 1.9GHz

Selects US PCS 1.9 GHz as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND PCS1DOT9G
Initial S/W Revision	A.05.00

AWS

Selects AWS as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND AWS
Initial S/W Revision	A.05.00

US 2.5GHz

Selects US 2.5 GHz as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND US2DOT5G
Initial S/W Revision	A.05.00

700 Public Safety

Selects 700 Public Safety as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO

Example	:SOUR:FREQ:CHAN:BAND PUBLIC
Initial S/W Revision	A.05.00

C2K Lower 700

Selects C2K Lower 700 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND LOWER
Initial S/W Revision	A.05.00

LTE

Sets LTE FDD as the radio standard for use and accesses the LTE FDD specific channel band sub-menus..

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.09.50

BAND 1

Selects BAND 1 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND1
Initial S/W Revision	A.09.50

BAND 2

Selects BAND 2 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND2
Initial S/W Revision	A.09.50

BAND 3

Selects BAND 3 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND3
Initial S/W Revision	A.09.50

BAND 4

Selects BAND 4 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND4
Initial S/W Revision	A.09.50

BAND 5

Selects BAND 5 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND5
Initial S/W Revision	A.09.50

BAND 6

Selects BAND 6 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND6
Initial S/W Revision	A.09.50

BAND 7

Selects BAND 7 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND7
Initial S/W Revision	A.09.50

BAND 8

Selects BAND 8 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND8
Initial S/W Revision	A.09.50

BAND 9

Selects BAND 9 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND9
Initial S/W Revision	A.09.50

BAND 10

Selects BAND 10 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND10
Initial S/W Revision	A.09.50

BAND 11

Selects BAND 11 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND11
Initial S/W Revision	A.09.50

BAND 12

Selects BAND 12 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND12
Initial S/W Revision	A.09.50

BAND 13

Selects BAND 13 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND13
Initial S/W Revision	A.09.50

BAND 14

Selects BAND 14 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND14
Initial S/W Revision	A.09.50

BAND 17

Selects BAND 17 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND17
Initial S/W Revision	A.09.50

BAND 18

Selects BAND 18 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND18
Initial S/W Revision	A.09.50

BAND 19

Selects BAND 19 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND19
Initial S/W Revision	A.09.50

BAND 20

Selects BAND 20 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND20
Initial S/W Revision	A.09.50

BAND 21

Selects BAND 21 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND21
Initial S/W Revision	A.09.50

BAND 24

Selects BAND 24 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND24
Initial S/W Revision	A.09.50

BAND 25

Selects BAND 25 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND25
Initial S/W Revision	A.09.50

BAND 26

Selects BAND 26 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND26
Initial S/W Revision	A.12.53

BAND 27

Selects BAND 27 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND27
Initial S/W Revision	A.14.00

BAND 28

Selects BAND 28 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND28
Initial S/W Revision	A.14.00

BAND 31

Selects BAND 31 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND31
Initial S/W Revision	A.14.00

LTE TDD

Sets LTE TDD as the radio standard for use and accesses the LTE TDD specific channel band sub-menus..

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.11.50

BAND 33

Selects BAND 33 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND33
Initial S/W Revision	A.11.50

BAND 34

Selects BAND 34 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND34
Initial S/W Revision	A.11.50

BAND 35

Selects BAND 35 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND35
Initial S/W Revision	A.11.50

BAND 36

Selects BAND 36 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND36
Initial S/W Revision	A.11.50

BAND 37

Selects BAND 37 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND37
Initial S/W Revision	A.11.50

BAND 38

Selects BAND 38 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND38
Initial S/W Revision	A.11.50

BAND 39

Selects BAND 39 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND39
Initial S/W Revision	A.11.50

BAND 40

Selects BAND 40 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND40
Initial S/W Revision	A.11.50

BAND 41

Selects BAND 41 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND41
Initial S/W Revision	A.11.50

BAND 42

Selects BAND 42 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND42
Initial S/W Revision	A.11.50

BAND 43

Selects BAND 43 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND43
Initial S/W Revision	A.11.50

BAND 44

Selects BAND 44 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND44
Initial S/W Revision	A.14.00

TDSCDMA

Sets TDSCDMA as the radio standard for use and accesses the TDSCDMA specific channel band sub-menus..

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.11.50

BAND A

Selects BAND A as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDA
Initial S/W Revision	A.11.50

BAND B

Selects BAND B as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDB
Initial S/W Revision	A.11.50

BAND C

Selects BAND C as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDC
Initial S/W Revision	A.11.50

BAND D

Selects BAND D as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDD
Initial S/W Revision	A.11.50

BAND E

Selects BAND E as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA

Example	:SOUR:FREQ:CHAN:BAND BANDE
Initial S/W Revision	A.11.50

BAND F

Selects BAND F as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDF
Initial S/W Revision	A.11.50

Radio Band Link

Allows you to specify the channel band type as either uplink or downlink link direction. This value is used in conjunction with the channel band and channel number to determine the absolute frequency output by the source. When set to “Uplink”, the source will calculate the uplink frequency using an uplink formula together with the selected channel band and channel number . When set to “Downlink”, the source will calculate the downlink frequency using a downlink formula together with the selected channel band and channel number.

Key Path	Source, Frequency, Radio Setup
Remote Command	`:SOURce:RADio:BAND:LINK DOWN|UP` `:SOURce:RADio:BAND:LINK?`
Example	:SOUR:RAD:BAND:LINK UP
Preset	DOWN
Range	DOWN | UP
Backwards Compatibility SCPI	`:SOURce:RADio:DEVice BTS|MS` `:SOURce:RADio:DEVice?`
Backwards Compatibility Notes	BTS maps to the Downlink frequency MS maps to the Uplink frequency
Initial S/W Revision	A.05.00

Set Reference Frequency

This key allows you to set the frequency reference. Pressing this key turns the frequency reference state to ON, sets the reference frequency value to the current frequency, maintains this frequency at the RF output, and sets the displayed frequency to 0.00 Hz. All subsequent frequencies entered under Source>Frequency>Frequency are interpreted as being relative to this reference frequency.

When you use a frequency reference, the signal generator outputs a frequency that is set relative to the reference frequency by the value entered under Source>Frequency>Frequency as follows:

Output frequency = reference frequency - entered frequency

Where:

reference frequency equals the original RF frequency entered under Source>Frequency>Frequency and set as the reference frequency

entered frequency equals a new value entered under Source>Frequency>Frequency

In addition, the displayed frequency value will be the same as the value entered under Source>Frequency>Frequency.

NOTE

If Freq Reference is set to ON with a reference value set, entering a value under Source>Frequency>Frequency and pressing Set Frequency Reference will add that value to the existing Freq Reference value.

If you wish to change the reference frequency value to the new value entered under Source>Frequency>Frequency, first you must set Freq Reference to OFF and then press Set Frequency Reference.

Key Path	Source, Frequency
Remote Command	`:SOURce:FREQuency:REFerence:SET`
Example	:SOUR:FREQ:REF:SET
Dependencies	This setting is unavailable, and is grayed out when the List Sequencer is turned ON.
Initial S/W Revision	A.05.00

Freq Reference

This key allows you to toggle the state of the frequency reference. When the frequency reference state is ON, an annunciator is displayed on the main source view to indicate this state to the user.

When you use a frequency reference, the signal generator outputs a frequency that is set relative to the reference frequency by the value entered under Source>Frequency>Frequency as follows:

Output frequency = reference frequency + entered frequency

Where:

reference frequency equals the original RF frequency entered under Source>Frequency>Frequency and set as the reference frequency

entered frequency equals a new value entered under Source>Frequency>Frequency

For more information on Reference Frequency refer to "Set Reference Frequency" on page 803

Key Path	Source, Frequency

Remote Command	`:SOURce:FREQuency:REFerence <freq>`
	`:SOURce:FREQuency:REFerence?`
	`:SOURce:FREQuency:REFerence:STATe OFF|ON|0|1`
	`:SOURce:FREQuency:REFerence:STATe?`

Example	:SOUR:FREQ:REF 0.00 Hz

	:SOUR:FREQ:REF:STATe ON
Dependencies	This setting is unavailable, and is grayed out when the List Sequencer is turned ON.
Couplings	The frequency reference state is coupled to the frequency reference set immediate action. When the reference set immediate action key is pressed, or the SCPI command issued, it turns the frequency reference state ON.
Preset	0.00 Hz OFF
Min	0.00 Hz
Max	Hardware Dependant: Option 503 = 3.6 GHz Option 504 = 3.8 GHz Option 506 = 6.00 GHz
Initial S/W Revision	A.05.00

Freq Offset

Allows you to specify the frequency offset value. When the frequency offset state is ON, an annunciator is displayed on the main source view to indicate this state to the user.

When the frequency offset is set to zero (0) and you set a new offset value, the displayed frequency value will change as follows and the RF output frequency will not change:

Displayed value = output frequency + offset value

Where:

output frequency equals the original frequency entered under Source>Frequency>Frequency

offset value equals the value entered under Source>Frequency>Freq Offset

When the frequency offset is set to a value other than zero (0) and you enter a new frequency value under Source>Frequency>Frequency, the displayed frequency will be the same as the value entered and the RF output frequency will be equal to the value entered minus the offset value as follows:

Output frequency = entered frequency – offset frequency

Displayed frequency = output frequency + offset frequency

Displayed frequency = entered frequency

Where:

entered frequency equals the frequency entered under Source>Frequency>Frequency

offset frequency equals the value previously entered and set under Source>Frequency>Freq Offset

Key Path	Source, Frequency
Remote Command	`:SOURce:FREQuency:OFFSet <freq>`

	:SOURce:FREQuency:OFFSet?
Example	:SOUR:FREQ:OFFS 0 Hz
Dependencies	This setting is unavailable, and is grayed out when the List Sequencer is turned ON.
Preset	0 Hz
Min	–100.00 GHz
Max	100.00 GHz
Initial S/W Revision	A.05.00

Modulation Setup

Allows access to the menus for setting up the available modulation types: "ARB" on page 806, "AM" on page 847, "FM" on page 848, and "PM" on page 849.

Key Path	Source
Initial S/W Revision	A.05.00

ARB

Allows you access to the ARB sub-menus.

Key Path	Source, Modulation Setup
Initial S/W Revision	A.05.00

ARB

Allows you to toggle the state of the ARB function. When the ARB is On, a “MOD” annunciator is displayed in the system settings panel. When the ARB is turned Off, the MOD annunciator is cleared

Key Path	Source, Modulation Setup, ARB
Remote Command	:SOURce:RADio:ARB[:STATe] ON|OFF|1|0 :SOURce:RADio:ARB[:STATe]?
Example	:SOUR:RAD:ARB OFF :SOUR:RAD:ARB?
Notes	If the ARB is ON, a user then loads or deletes another file to ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Dependencies	This setting is for independent mode and has no effect on 3.3.8 list sequencer mode. Setting "Sequencer" on page 851 Sequencer to On will put source enter list sequencer mode, and even if ARB state is On, the ARB file will not be played. Setting "Sequencer" on page 851 Sequencer to Off will make source leave list sequencer mode, and this setting will take effect immediately.

	The ARB can only be turned on when there is a waveform file selected for playback. On the GUI If no waveform is selected, this key is grayed out. If you send the SCPI command to turn the ARB on with no waveform selected for playback, the ARB state remains OFF and an error is generated. "- When you try to recall a certain set of states in which the selected waveform is not in ARB memory and the ARB state is On, errors are reported
Preset	Off
Range	On | Off
Initial S/W Revision	A.05.00

Select Waveform

Allows you to access to the waveform selection sub-menus.

Pressing this key changes the central view area to show the Waveform File Selection view.

Key Path	Source, Modulation Setup, ARB
Initial S/W Revision	A.05.00

Select Waveform

Allows you to select a waveform sequence or segment for the dual ARB to play.

NOTE: Selecting a waveform file does not result in automatic adjustments to burst timing (to compensate for the presence or absence of a Multiport Adapter); that adjustment occurs only when a waveform is loaded to ARB memory. See "Load Segment to ARB Memory" for more information about this adjustment.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Remote Command	`:SOURce:RADio:ARB:WAVeform <string>` `:SOURce:RADio:ARB:WAVeform?`
Example	:SOUR:RAD:ARB:WAV "test_waveform.bin"
Notes	If intended waveform is not in the memory yet, then issuing this command by SCPI will invoke ARB loading operation first, which involves a delay of unpredictable length. So this command should be followed by the query *OPC?, which holds off subsequent commands until the loading operating is complete. <string> - specifies the name of the waveform segment or waveform sequence to be played by the ARB. When in Sequence Analyzer mode, and Include Source is Yes, if the you attempt to play a waveform sequence but not all the required waveform segments are in the ARB playback memory, the application will reject the loading operation with an error is generated . When Include Source is No, if you attempt to play a waveform sequence but not all the required waveform segments are contained in the ARB playback memory, the application will attempt to load the required segments from either the default directory of the current directory. If the ARB memory does not have enough space for all the waveform segments to be loaded, an error is generated and

	none of the waveform segments is loaded. If the ARB is ON, and you attampt to play a waveform sequence but not all the waveform segments within the sequence could be found to be loaded into ARB memory, an error is generated. The selected waveform keeps the previous value and ARB state remains On. If you specify a waveform segment over SCPI but the waveform segment is not present within ARB playback memory and cannot be found for auto loading within the current directory or the default directory, an error is generatedand the file selection remains unchanged. If you select a waveform for playback and the waveform requires a license that is not installed on the instrument, an error is generated.error is generated. If the ARB is ON and you load a file to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Segments on Hard Disk

Allows you access to the sub-menus for loading waveform segments from the hard disk into ARB memory. The default directory is: D: varb.

Pressing this key changes the current view to the Waveform Management View.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Initial S/W Revision	A.05.00

Load Segment To ARB Memory

Allows you to load the selected file into ARB memory. On the front panel you select the file for loading to the ARB memory by highlighting the desired file in the list. Using the SCPI command, you specify the file name on the HDD.

“NVWFM” (none-volatile storage) MSUS (Mass Storage Unit Specifier) is supported in the memory subsystem because the ARB memory cannot be accessed directly. Therefore, files must be downloaded to the instrument hard disk and then loaded into the ARB memory. “NVWFM” MSUS will be mapped to the default directory D: VARB. The SCPI command supports using either “NVWFM” MSUS or specifying a full path. For more information, see Memory Subsystem (Remote Command Only).

If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MMEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk

Remote Command	`:SOURce:RADio:ARB:LOAD <string>`
Example	:SOUR:RAD:ARB:LOAD “D: VARB\testwaveform.bin” or :SOUR:RAD:ARB:LOAD “NVWFM:testwaveform.bin”
Notes	Because loading the file involves a delay of unpredictable length, this command should be followed by the query *OPC?, which holds off subsequent commands until the loading operating is complete. <string> – specifies the path name of the file to load from the HDD into ARB memory. It could be a <full path + filename>, or <“NVWFM” MSUS + colon + filename>. When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load a file to ARB memory will be rejected with an error. When Include Source is Noand if there is insufficient free ARB memory to load the selected waveform, an error is generated. . If you specify a file over SCPI, but the file is not at the specified location, an error is generated. If you try to load a waveform file but the file contains less than 500 IQ sampes, an error is generated. If you try to load a Signal Studio waveform “*.wfm” which contains invalid waveform header, an error is generated. If the ARB is ON when you load afile to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished. ARB can be loaded into ARB memory even required licenses do not present on the instrument. In this case, a GUI only warning message –800, “Operation complete; Loaded <filename> successfully, but no license <required licenses> installed”. User can install required licenses according to <required licenses> string to license it, or multi-pack license it.
Initial S/W Revision	A.05.00

Load All To ARB Memory

Allows you to load all the segment files within the currently selected directory into ARB memory. If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:LOAD:ALL <string>`
Example	:SOUR:RAD:ARB:LOAD:ALL “D: varb”
Notes	<string> - specifies the directory on the HDD to load the files into ARB memory from. When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load all files from a directory to ARB memory is rejected with an error. When Include Source is No and there is insufficient free ARB memory to load all the waveforms,

	when the ARB memory is full, the copy ceases, and an error is generated. If you specify a directory over SCPI, but the directory does not exist, an error is generated. If the ARB is ON, a user then loads or deletes file to ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Change Directory...

Allows you to change the currently selected directory on the hard disk. Pressing this key opens a standard windows change directory dialog allowing you to select the new directory of interest.

The current directory is used for manually loading waveform segments into ARB memory for playback, and as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence or a list sequence.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Notes	No remote command, SCPIfront panel only.
Initial S/W Revision	A.05.00

Default Directory...

Allows you to change the default directory. It is used as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence, and as a search location for selecting waveforms using SCPI.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:DEFault:DIRectory <string>` `:SOURce:RADio:ARB: DEFault:DIRectory?`
Example	:SOUR:RAD:ARB:DEF:DIR “D:\ArbFiles” :SOUR:RAD:ARB:DEF:DIR?
State Saved	Persistent, survives a power cycle and a preset but not saved in the instrument state
Initial S/W Revision	A.05.00

Segments in ARB Memory

Allows you access to the sub-menus for managing the files within ARB memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Initial S/W Revision	A.05.00

Delete Segment From ARB Mem

Allows you to remove a segment from ARB playback memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments in ARB Memory
Remote Command	`:SOURce:RADio:ARB:DELete <string>`
Example	:SOUR:RAD:ARB:DEL “testwaveform.bin”
Notes	<string> - specifies the waveform to be deleted from the ARB playback memory. When in Sequence Analyzer mode and Include Source is Yes, an attempt to delete a file from ARB memory is rejected with an error. When Include Source is No and you specify a file that does not exist within ARB memory, an error is generated. It is possible to delete files from within the ARB memory when the ARB is ON. However, if you attempt to delete the file that is currently playing an error is generated. It is possible to delete a file from within the ARB memory when the sequencer state is ON and the file is not being used by the List Sequencer. If you attempt to delete a file which is being used by the list sequencer, an error is generated. When sequencer state is On, even if ARB state is On, the selected waveform will not be played. In this case, if the selected waveform is not used in List Sequence, it can be deleted and the ARB state is turned Off. If the ARB is ON and you load a file to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Delete All From ARB Memory

Allows you to remove all segments from ARB playback memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments in ARB Memory
Remote Command	`:SOURce:RADio:ARB:DELete:ALL`
Example	:SOUR:RAD:ARB:DELete:ALL
Notes	When in Sequence Analyzer mode and Include Source is Yes, an attempt to delete all files from ARB memory is rejected with an error. When Include Source is No and you attempt to delete all files from ARB memory when the ARB is currently playing a file, all files except the one playing are deleted and an error is generated. If you attempt to delete all files from ARB memory when there are waveform files used in "List Sequencer" on page 850 and "Sequencer" on page 851 state is ON, all files except the files currently being used in list sequencer are deleted, and an error is generated. If the ARB is ON and you load a file to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Query ARB Memory File List (Remote Command Only)

Queries the test set for the list of waveform segments in the ARB memory.

NOTE This command returns a string for waveform segment names in ARB memory. If you want a string list of waveform segments in the ARB memory, use "Query ARB Memory Full File List (Remote Command Only)" on page 812.

Remote Command	`:SOURce:RADio:ARB:CATalog?`
Example	:SOUR:RAD:ARB:CATalog?
Notes	The return data is in the following format: <integer> - memory used <integer> - memory free <string> ... - comma separated list of waveform segments within ARB memory
Initial S/W Revision	A.05.00

Query ARB Memory Full File List (Remote Command Only)

Queries the test set for the string list of waveform segments in the ARB memory. It returns a string list for waveform segment names in the ARB memory.

Remote Command	`:SOURce:RADio:ARB:FCATalog?`
Example	:SOUR:RAD:ARB:FCATalog?
Notes	The return data is in the following format: <integer> - memory used <integer> - memory free <integer> - file count in ARB memory <string>,<string>, ... <string> - comma separated string list of waveform segments within ARB memory Example: SOUR:RAD:ARB:FCAT? EXT returns: 27499,2069653,3,”c2k.wfm”,”gsm.wfm”,”wcdma.wfm”
Initial S/W Revision	A.09.00

ARB Setup

Allows access to the ARB setup sub-menus.

Key Path	Source, Modulation Setup, ARB
Initial S/W Revision	A.05.00

Sample Rate

Allows you to set the ARB waveform playback sample rate.

Key Path	Source, Modulation Setup, ARB, ARB Setup
Remote Command	`:SOURce:RADio:ARB:SCLock:RATE <freq>` `:SOURce:RADio:ARB:SCLock:RATE?`
Example	:SOUR:RAD:ARB:SCL:RATE 48.00 MHz
Notes	If there is a sample rate specified in the header of the waveform file, changing that sample rate is not recommended, as it may cause problems with burst timing.
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The sample rate is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the sample rate is updated with the value from the header file. The sample rate will remain unchanged if the newly selected waveform does not have an associated header file.
Preset	125.00 MHz
Min	1.00 kHz
Max	125.00 MHz
Initial S/W Revision	A.05.00

Run-Time Scaling

Allows you to adjust the run-time scaling value. The run-time scaling value is applied in real-time while the waveform is playing.

Key Path	Source, Modulation Setup, ARB, ARB Setup
Remote Command	`:SOURce:RADio:ARB:RSCaling <real>` `:SOURce:RADio:ARB:RSCaling?`
Example	:SOUR:RAD:ARB:RSC 100.00
Notes	This setting cannot be set in E6640A. Grey out on menu and the value is fixed at 70.00%.
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The run-time scaling is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the run-time scaling is updated with the value from the header file. The run-time scaling will remain unchanged if the newly selected waveform does not have an associated header file.
Preset	70.00 %
Min	1.00 %
Max	100.00 %
Initial S/W Revision	A.05.00

Baseband Freq Offset

Allows you to adjust the value by which the baseband frequency is offset relative to the carrier.

Key Path	Source, Modulation Setup, ARB, ARB Setup
Remote Command	`:SOURce:RADio:ARB:BASeband:FREQuency:OFFSet <freq>` `:SOURce:RADio:ARB:BASeband:FREQuency:OFFSet?`
Example	:SOUR:RAD:ARB:BAS:FREQ:OFFS 0.00 Hz
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The baseband frequency offset is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the baseband frequency offset is updated with the value from the header file. The baseband frequency offset will remain unchanged if the newly selected waveform does not have an associated header file.
Preset	0.00 Hz
Min	–50.00 MHz
Max	50.00 MHz
Initial S/W Revision	A.05.00

Trigger Type

Allows access to the trigger type sub-menus. The setting for trigger type determines the behavior of the waveform when it plays.

Key Path	Source, Modulation Setup, ARB
Remote Command	`:SOURce:RADio:ARB:TRIGger:TYPE CONTinuous | SINGle | SADVance GATE` `:SOURce:RADio:ARB:TRIGger:TYPE?`
Example	:SOUR:RAD:ARB:TRIG:TYPE CONT :SOUR:RAD:ARB:TRIG:TYPE?
Notes	Gated trigger type will be implemented at a later release
Preset	CONTinuous
Range	Continuous | Single | Seg Adv | Gated
Initial S/W Revision	A.05.00

Continuous

Sets the active trigger type to Continuous. If Continuous is already selected as the active trigger type, pressing this key allows access to the continuous trigger type setup menu. In Continuous trigger mode, the waveform repeats continuously.

Key Path	Source, Modulation Setup, ARB, Trigger Type
Remote Command	`:SOURce:RADio:ARB:TRIGger:TYPE:CONTinuous[:TYPE] FREE | TRIGger | RESet` `:SOURce:RADio:ARB:TRIGger:TYPE:CONTinuous[:TYPE]?`
Example	:SOUR:RAD:ARB:TRIG:TYPE:CONT FREE
Preset	FREE

Range	Free Run | Trigger + Run | Reset + Run
Initial S/W Revision	A.05.00

Free Run

Selects Free Run as the trigger response for the continuous trigger type. Free Run sets the waveform generator to play a waveform sequence or segment continuously, without waiting for a trigger. In this mode, the waveform generator does not respond to triggers.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Continuous
Example	:SOUR:RAD:ARB:TRIG:TYPE:CONT FREE
Initial S/W Revision	A.05.00

Trigger + Run

Sets Trigger and Run as the trigger response for the continuous trigger type. Trigger and Run sets the waveform generator to play a waveform sequence or segment continuously when the first trigger is received, and to ignore any subsequent triggers.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Continuous
Example	:SOUR:RAD:ARB:TRIG:TYPE:CONT TRIG
Initial S/W Revision	A.05.00

Reset + Run

Sets Reset and Run as the trigger response for the continuous trigger type. Reset and Run sets the waveform generator to play a waveform sequence or segment continuously when the first trigger is received. Subsequent triggers reset the waveform sequence or segment to the start, and then play it continuously.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Continuous
Example	:SOUR:RAD:ARB:TRIG:TYPE:CONT RES
Initial S/W Revision	A.05.00

Single

Sets the active trigger type to Single. If Single is already selected as the active trigger type, pressing this key allows access to the single trigger type setup menu. In Single trigger mode, the waveform plays once.

Key Path	Source, Modulation Setup, ARB, Trigger Type
Remote Command	`:SOURce:RADio:ARB:RETRigger ON|OFF|IMMediate`

	:SOURce:RADio:ARB:RETRigger?
Example	:SOUR:RAD:ARB:RETR OFF
Notes	ON: Buffered Trigger OFF: No Retrigger Immediate: Restart on Trigger This is defined as an enumerated SCPI command, with ON|OFF being considered as enumerated types rather than Boolean. This means the query will return OFF instead of 0, and ON instead of 1.
Preset	ON
Range	No Retrigger | Buffered Trigger | Restart on Trigger
Initial S/W Revision	A.05.00

No Retrigger

Selects No Retrigger as the trigger response for single trigger type. No Retrigger sets the waveform generator to play a waveform sequence or segment once when a trigger is received. Any triggers then received during playback are ignored.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Single
Example	:SOUR:RAD:ARB:RETR OFF
Initial S/W Revision	A.05.00

Buffered Trigger

Selects Buffered Trigger as the trigger response for single trigger type. Buffered Trigger sets the waveform generator to play a waveform sequence or segment once when a trigger is received. If a trigger is received during playback, the waveform generator plays the sequence or segment to the end, then plays the sequence or segment once more.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Single
Example	:SOUR:RAD:ARB:RETR ON
Initial S/W Revision	A.05.00

Restart on Trigger

Selects Restart on Trigger as the trigger response for single trigger type. Restart on Trigger sets the waveform generator to play a waveform sequence or segment once when a trigger is received. If a trigger is received during playback, the waveform generator resets and plays the sequence or segment from the start.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Single
Example	:SOUR:RAD:ARB:RETR IMM
Initial S/W Revision	A.05.00

Segment Advance

Sets the active trigger type to Segment Advance. If Segment Advance is already selected as the active trigger type, pressing this key allows access to the segment advance trigger type setup menu.

Segment Advance triggering allows you to control the playback of waveform segments within a waveform sequence. When a trigger is received the ARB advances to the next waveform segment within the waveform sequence. This type of triggering ignores the repetition count for the waveform segment within the waveform sequence. For example, if a waveform segment has a repetition count of 10 and you select single segment advance triggering mode, the waveform segment will only play once.

Segment Advance triggering can also be used for waveform segments only. In this situation the same waveform segment is played again when a trigger is received.

Key Path	Source, Modulation Setup, ARB, Trigger Type
Remote Command	`:SOURce:RADio:ARB:TRIGger:TYPE:SADVance[:TYPE] SINGle | CONTinuous` `:SOURce:RADio:ARB:TRIGger:TYPE:SADVance[:TYPE]?`
Example	:SOUR:RAD:ARB:TRIG:TYPE:SADV SING
Preset	CONTinuous
Range	Single | Continuous
Initial S/W Revision	A.05.00

Single

Selects Single as the trigger response for Segment Advance trigger type. With single selected, once a trigger is received a segment is played once. If a trigger is received during playback of a segment, the segment plays to completion and the next segment is played once.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Segment Advance
Example	:SOUR:RAD:ARB:TRIG:TYPE:SADV SING
Initial S/W Revision	A.05.00

Continuous

Selects Continuous as the trigger response for Segment Advance trigger type. With continuous selected, once a trigger is received a segment is played continuously. When subsequent triggers are received, the currently playing segment plays to completion and then the next segment is played continuously.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Segment Advance
Example	:SOUR:RAD:ARB:TRIG:TYPE:SADV CONT
Initial S/W Revision	A.05.00

Trigger Source

Allows access to the trigger source sub-menus. The trigger source setting determines how the source receives the trigger that starts the waveform playing. Therefore, this key is grayed out if the trigger type is free run, since free run triggers immediately with no trigger source required.

Key Path	Source, Modulation Setup, ARB
Remote Command	`:SOURce:RADio:ARB:TRIGger[:SOURce] KEY|BUS|EXTernal2` `:SOURce:RADio:ARB:TRIGger[:SOURce]?`
Example	:SOUR:RAD:ARB:TRIGger KEY
Dependencies	This key is grayed out if the current trigger type is Continuous, Free Run.
Preset	EXTernal2
Range	Trigger Key | Bus | External 2
Initial S/W Revision	A.05.00

Trigger Key

Sets the current trigger source to the front panel Trigger key. When Trigger Key is selected, the waveform is triggered when you press the front panel Trigger key.

Key Path	Source, Modulation Setup, ARB, Trigger Source
Example	:SOUR:RAD:ARB:TRIGger KEY
Initial S/W Revision	A.05.00

Bus

Sets the current trigger source to Bus. Selecting Bus trigger source enables triggering over GPIB, LAN, or USB using the :SOURce:RADio:ARB:TRIGger:INITiate command.

Key Path	Source, Modulation Setup, ARB, Trigger Source
Example	:SOUR:RAD:ARB:TRIGger BUS
Initial S/W Revision	A.05.00

External 2

Sets the current trigger source to External 2. Selecting External 2 enables triggering a waveform by an externally applied signal.

Key Path	Source, Modulation Setup, ARB, Trigger Source
Example	:SOUR:RAD:ARB:TRIGger EXT2
Notes	Note: When on E6640A, trigger 2 is a bi-directional trigger port. So when trigger 2 has been configured as OUTPUT type, choosing External 2 as the input trigger for the current step will generate error.
Initial S/W Revision	A.05.00

Trigger Initiate

Used to initiate an immediate trigger event if the trigger source is set to Trigger Key.

Key Path	Source, Modulation Setup, ARB
Notes	No remote command, SCPIfront panel only.
Initial S/W Revision	A.05.00

Waveform Sequences

Allows access to the waveform sequence sub-menus. Pressing this key changes the central view area to display the Waveform Sequence List view.

Key Path	Source, Modulation Setup, ARB
Notes	No remote command, SCPI front panel only.
Initial S/W Revision	A.05.00

Build New Sequence

Allows access to the sub-menus for creating a new waveform sequence. Pressing this key changes the central view area to display the Waveform Sequence Creation and Editing view.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences
Notes	No remote command, SCPIfront panel only.
Initial S/W Revision	A.05.00

Current Segment

Specifies the selected sequence segment that will be affected by the menu functions.

Key Path	Source, Modulation Setup , ARB, Waveform Sequences, Build New Sequence
Notes	No remote command, SCPI front panel only. This key is grayed out and unavailable if the sequence is currently empty.
Initial S/W Revision	A.05.00

Insert New Waveform

Allows you access to the sub-menu for inserting a new waveform segment or sequence. Pressing this key also changes the central display to show the Waveform File Selection View.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence
Notes	No remote command, SCPIfront panel only. Waveform segment name string length upper limit is 128 chars. Please do NOT insert waveform which name string exceeds 128 chars.
Initial S/W Revision	A.05.00

Insert Waveform

Inserts the currently highlighted waveform to the end of the waveform sequence. Pressing this key also returns you to the menus for creating or editing a sequence, and returns the central view to the sequence creation view.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform
Notes	No remote command, SCPIfront panel only. Waveform segment name string length upper limit is 128 chars. Please do NOT insert waveform which name string exceeds 128 chars.
Initial S/W Revision	A.05.00

Segments on Hard Disk

Allows you access to the sub-menus for loading waveform segments from the hard disk into ARB memory. The default directory is: D: varb.

Pressing this key changes the current view to the Waveform Management View.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Initial S/W Revision	A.05.00

Load Segment To ARB Memory

Allows you to load the selected file into ARB memory. On the front panel you select the file for loading to the ARB memory by highlighting the desired file in the list. Using the SCPI command, you specify the file name on the HDD.

“NVWFM” (none-volatile storage) MSUS (Mass Storage Unit Specifier) is supported in the memory subsystem because the ARB memory cannot be accessed directly. Therefore, files must be downloaded to the instrument hard disk and then loaded into the ARB memory. “NVWFM” MSUS will be mapped to the default directory D: VARB. The SCPI command supports using either “NVWFM” MSUS or specifying a full path. For more information, see Memory Subsystem (Remote Command Only).

If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MMEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:LOAD <string>`
Example	:SOUR:RAD:ARB:LOAD “D: VARB\testwaveform.bin” or :SOUR:RAD:ARB:LOAD “NVWFM:testwaveform.bin”
Notes	Because loading the file involves a delay of unpredictable length, this command should be followed by the query *OPC?, which holds off subsequent commands until the loading operating is complete. <string> – specifies the path name of the file to load from the HDD into ARB memory. It could be a <full path + filename>, or <“NVWFM” MSUS + colon + filename>. When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load a file to ARB memory will be rejected with an error. When Include Source is Noand if there is insufficient free ARB memory to load the selected waveform, an error is generated. . If you specify a file over SCPI, but the file is not at the specified location, an error is generated. If you try to load a waveform file but the file contains less than 500 IQ sampes, an error is generated. If you try to load a Signal Studio waveform “*.wfm” which contains invalid waveform header, an error is generated. If the ARB is ON when you load afile to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished. ARB can be loaded into ARB memory even required licenses do not present on the instrument. In this case, a GUI only warning message –800, “Operation complete; Loaded <filename> successfully, but no license <required licenses> installed”. User can install required licenses according to <required licenses> string to license it, or multi-pack license it.
Initial S/W Revision	A.05.00

Load All To ARB Memory

Allows you to load all the segment files within the currently selected directory into ARB memory. If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:LOAD:ALL <string>`

Example	:SOUR:RAD:ARB:LOAD:ALL “D: varb”
Notes	<string> - specifies the directory on the HDD to load the files into ARB memory from. When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load all files from a directory to ARB memory is rejected with an error. When Include Source is No and there is insufficient free ARB memory to load all the waveforms, when the ARB memory is full, the copy ceases, and an error is generated. If you specify a directory over SCPI, but the directory does not exist, an error is generated. If the ARB is ON, a user then loads or deletes file to ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Change Directory...

Allows you to change the currently selected directory on the hard disk. Pressing this key opens a standard windows change directory dialog allowing you to select the new directory of interest.

The current directory is used for manually loading waveform segments into ARB memory for playback, and as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence or a list sequence.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Notes	No remote command, SCPIfront panel only.
Initial S/W Revision	A.05.00

Default Directory...

Allows you to change the default directory. It is used as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence, and as a search location for selecting waveforms using SCPI.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:DEFault:DIRectory <string>` `:SOURce:RADio:ARB: DEFault:DIRectory?`
Example	:SOUR:RAD:ARB:DEF:DIR “D:\ArbFiles” :SOUR:RAD:ARB:DEF:DIR?
State Saved	Persistent, survives a power cycle and a preset but not saved in the instrument state
Initial S/W Revision	A.05.00

Segments in ARB Memory

Allows you access to the sub-menus for managing the files within ARB memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Initial S/W Revision	A.05.00

Delete Segment From ARB Mem

Allows you to remove a segment from ARB playback memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments in ARB Memory
Remote Command	`:SOURce:RADio:ARB:DELete <string>`
Example	:SOUR:RAD:ARB:DEL “testwaveform.bin”
Notes	<string> - specifies the waveform to be deleted from the ARB playback memory. When in Sequence Analyzer mode and Include Source is Yes, an attempt to delete a file from ARB memory is rejected with an error. When Include Source is No and you specify a file that does not exist within ARB memory, an error is generated. It is possible to delete files from within the ARB memory when the ARB is ON. However, if you attempt to delete the file that is currently playing an error is generated. It is possible to delete a file from within the ARB memory when the sequencer state is ON and the file is not being used by the List Sequencer. If you attempt to delete a file which is being used by the list sequencer, an error is generated. When sequencer state is On, even if ARB state is On, the selected waveform will not be played. In this case, if the selected waveform is not used in List Sequence, it can be deleted and the ARB state is turned Off. If the ARB is ON and you load a file to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Delete All From ARB Memory

Allows you to remove all segments from ARB playback memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments in ARB Memory
Remote Command	`:SOURce:RADio:ARB:DELete:ALL`
Example	:SOUR:RAD:ARB:DELete:ALL
Notes	When in Sequence Analyzer mode and Include Source is Yes, an attempt to delete all files from ARB memory is rejected with an error. When Include Source is No and you attempt to delete all files from ARB memory when the ARB is currently playing a file, all files except the one playing are deleted and an error is generated. If you attempt to delete all files from ARB memory when there are waveform files used in "List Sequencer" on page 850 and "Sequencer" on page 851 state is ON, all files except the files currently being used in list sequencer are deleted, and an error is generated.

	If the ARB is ON and you load a file to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Segments on Hard Disk

This key functions the same as "Segments on Hard Disk" on page 877.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform
Initial S/W Revision	Prior to A.09.00

Load Segment To ARB Memory

This key functions the same as "Load Segment To ARB Memory" on page 877.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Load All To ARB Memory

This key functions the same as "Load All To ARB Memory" on page 878.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Change Directory ...

This key functions the same as "Change Directory..." on page 879.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Default Directory ...

This key functions the same as "Default Directory..." on page 879

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Segments in ARB Memory

This key functions the same as "Segments in ARB Memory" on page 879.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform
Initial S/W Revision	Prior to A.09.00

Delete Segment From ARB Memory

This key functions the same as "Delete Segment From ARB Mem" on page 879.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform, Segment in ARB Memory
Initial S/W Revision	Prior to A.09.00

Delete All From ARB Memory

This key functions the same as "Delete All From ARB Memory" on page 880.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform, Segment in ARB Memory
Initial S/W Revision	Prior to A.09.00

Query ARB Memory File List (Remote Command Only)

This command functions the same as "Query ARB Memory File List (Remote Command Only)" on page 812.

Initial S/W Revision	Prior to A.09.00

Edit Selected Waveform

Allows access to the sub-menus for editing the details of the currently selected waveform segment.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence
Notes	No remote command, front panel only.
Initial S/W Revision	A.05.00

Repetitions

Allows you to specify the number of times the currently selected waveform is played within the sequence.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Edit Selected Waveform
Notes	No remote command, SCPIfront panel only.
Preset	1
Min	1
Max	65535
Initial S/W Revision	A.05.00

Marker 1

Allows you to enable or disable marker 1 for the currently selected waveform. For a waveform sequence, you can enable and disable markers on a per-segment basis, allowing you to output markers from some waveform segments within the sequence, but not for others.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Edit Selected Waveform
Notes	No remote command, front panel only.
Preset	Enabled
Range	Enabled|Disabled
Initial S/W Revision	A.05.00

Marker 2

Allows you to enable or disable marker 2 for the currently selected waveform. For a waveform sequence, you can enable and disable markers on a per-segment basis, allowing you to output markers from some waveform segments within the sequence, but not for others.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Edit Selected Waveform
Notes	No remote command, front panel only.
Preset	Enabled
Range	Enabled|Disabled
Initial S/W Revision	A.05.00

Marker 3

Allows you to enable or disable marker 3 for the currently selected waveform. For a waveform sequence, you can enable and disable markers on a per-segment basis, allowing you to output markers from some waveform segments within the sequence, but not for others.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Edit Selected

	Waveform
Notes	No remote command, front panel only.
Preset	Enabled
Range	Enabled|Disabled
Initial S/W Revision	A.05.00

Marker 4

Allows you to enable or disable marker 4 for the currently selected waveform. For a waveform sequence, you can enable and disable markers on a per-segment basis, allowing you to output markers from some waveform segments within the sequence, but not for others.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Edit Selected Waveform
Notes	No remote command, front panel only.
Preset	Enabled
Range	Enabled|Disabled
Initial S/W Revision	A.05.00

Delete Segment

Allows you to delete the selected segment from the waveform sequence.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence
Notes	No remote command, front panel only.
Initial S/W Revision	A.05.00

Save Sequence...

Pressing this key displays the “Save As” dialog. The sequence name is passed to the save as dialog to use as the filename for saving, and the directory the save as dialog will open into is the default waveform directory.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence
Initial S/W Revision	A.05.00

Build New Sequence (Remote Command Only)

This command is the SCPI equivalent of the waveform sequence creation features described in "Build New Sequence" on page 819.

This command writes a waveform sequence file to the hard disk. You must specify the waveform sequence file path and filename which will be saved on the hard disk, and the waveform segment file path and name which will be nested into the waveform sequence file. You can utilize mass storage unit specifier (MSUS) “NVWFM” or use a real full path representation. See the example below. MSUS “NVWFM” is mapped to D: VARB directory on test set hard disk.

Any number of segments, up to a segment count limit of 64, can be used to create a sequence. Repeated segments are included in the count limit.

Each waveform segment name string length upper limit is 128 chars. Please do NOT insert waveform which name string exceeds 128 chars.

The internal source does not support nesting one waveform sequence file into another waveform sequence file.

Remote Command	`:SOURce:RADio:ARB:SEQuence[:MWAVeform] <filename>, <waveform1>, <reps>, NONE | M1 | M2 | M3 | M4 | M1M2 | M1M3 | M1M4 | M2M3 | M2M4 | M3M4 | M1M2M3 | M1M2M4 | M1M3M4 | M2M3M4 | M1M2M3M4 | ALL, {<waveform2>, <reps>, NONE | M1 | M2 | M3 | M4 | M1M2 | M1M3 | M1M4 | M2M3 | M2M4 | M3M4 | M1M2M3 | M1M2M4 | M1M3M4 | M2M3M4 | M1M2M3M4 | ALL, } …` (For additional description of each item, see Notes below "For Setup SCPI" on page 362“For Setup SCPI”.) `:SOURce:RADio:ARB:SEQuence[:MWAVeform]? <filename>` (For additional description of each item, see Notes "For Query SCPI" on page 363 below.)
Example	For setup: >:SOUR:RAD:ARB:SEQ “NVWFM:testSeq1.seq”, “NVWFM:wfmSegment1.wfm”, 10, M2M3M4, “NVWFM:wfmSegment2.wfm”, 20, M1M3 Or >:SOUR:RAD:ARB:SEQ “D: VARB\testSeq1.seq”, “ D: VARB\wfmSegment1.wfm”, 10, M2M3M4, “ D: VARB\wfmSegment2.wfm”, 20, M1M3 For query, must specify which waveform sequence file to query. >:SOUR:RAD:ARB:SEQ? “NVWFM:testSeq1.seq” Or >:SOUR:RAD:ARB:SEQ? “D: VARB\testSeq1.seq”,
Notes	## For Setup SCPI For the Setup SCPI command, the parameters are: <filename> - String Type This variable specifies the path and name for the waveform sequence file. The path supports MSUS (NVWFM) or a real full path representation. See example. <waveform1> - String Type This variable specifies the path and name of the first existing waveform segment. The path supports MSUS (NVWFM) or a real full path representation. See example. The segment file must reside within ARB playback memory before it can be played by the ARB player. <reps> - Integer Type

	This variable specifies the number of times a segment or sequence plays before moving on to the next segment or sequence. <marker> - Enum Type NONE – This choice disables all four markers for the waveform. Disabling markers means that the waveform sequence ignores the segments or sequence marker settings. M1, M2, M3, M4 – these choices, either individually or a combination of them, enable the markers for the waveform segment or sequence. Markers not specified are ignored for that segment or sequence. ALL – This choice enables all four markers in the waveform segment or sequence. <waveform2> - String type. This variable specifies the name of a second existing waveform segment. The path supports MSUS (NVWFM) and real full path representation both. See example. The segment file must reside within ARB playback memory before it can be played by the ARB player. <reps> same as above, for the 2nd waveform segment. <marker> same as above, for the 2nd waveform segment. You can insert several waveform segments into a waveform sequence file. Just repeat inserting waveform segments as described above. Error Checks for Setup SCPI command: If you do not specify a filename, or you use an unsupported MSUS (that is, not NVWFM), or have an error in the waveform sequence file path, an error is generated.
Notes	Error Checks for Query SCPI command: (Continued) If the specified waveform sequence file name suffix is not ".seq", error is generated. If you use an unsupported MSUS (that is, not NVWFM), or have an error in the waveform segment file path, an error is generated. If the first specified waveform file cannot be found, an error is generated. If you nest one waveform sequence file into another waveform sequence file, an error is generated. If the specified repetition value is larger than 65535 or smaller than 1, an error is generated. If the specified marker type is unrecognized, an error is generated. For Query SCPI For the Query the parameters are: <filename> - String type. This variable specifies the path and name of the waveform sequence file being queried. The path supports MSUS (NVWFM) or a real full path representation. See example. The return value is a <string>, which includes each waveform segment file name, repetitions, and marker type. For example: >:SOUR:RAD:ARB:SEQ? "NVWFM:testSeq1.seq", <"wfmSegment1. wfm, 10, ALL, wfmSegment2.wfm, 20, M1M3", Error Checks for Query SCPI command: If you do not specify a filename, an error is generated. If the waveform sequence file name is empty, an error is generated. If the specified waveform sequence file cannot be found, an error is generated.
Initial S/W Revision	A.05.00

Edit Selected Sequence

Allows access to the sub-menus for editing the sequence currently selected within the Waveform Sequence List view. Pressing this key changes the central view area to display the Waveform Sequence Creation and Editing view.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences
Notes	No remote command, front panel only.
Initial S/W Revision	A.05.00

Current Directory...

Allows you to change the currently selected directory on the hard disk. Pressing this key opens a standard windows change directory dialog and allows you to select the new directory of interest.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences
Notes	No remote command, front panel only.
Initial S/W Revision	A.05.00

Waveform Utilities

Allows you access to the waveform utilities sub-menus.

Key Path	Source, Modulation Setup, ARB
Initial S/W Revision	A.05.00

Multi-Pack Licenses

Allows you access to the Multi - Pack License sub-menus. Pressing this key also changes the central view area to display the Multi -Pack License Management view.

On modular instrument like E6630A or E6640A, multi-pack license operations are only allowed on the default module, i.e. “Left” module for E6630A or “TRX1” module for E6640A.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities
Notes	If access multi-pack license sub-menu from modules other than “TRX1”, an advisory message like “Please goto “TRX1” to operate multi-pack license” will display.
Dependencies	This key is only available if there is at least one Multi-pack license installed on the instrument.
Initial S/W Revision	A.05.00

Add Waveform

Pressing this key accesses the Add Waveform sub-menu. It also changes the central display area to display the Multi-Pack License Waveform Add view.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses
Dependencies	This key is only available if there is at least one slot available within at least one multi-pack license.
Initial S/W Revision	A.05.00

Add Waveform

Allows you to add the currently selected waveform segment to a multi-pack license. The new waveform is added to the next available slot regardless of which slot was selected on the Multi-Pack License Management view.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Add Waveform

Remote Command	`:SYSTem:LKEY:WAVeform:ADD <string>`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:ADD <string>`

Example	SYST:LKEY:WAV:ADD “mywaveform.wfm” or SYST:LIC:WAV:ADD “mywaveform.wfm”
Notes	The second SCPI :SYSTem:LICense[:FPACk]:WAVeform:ADD is provided to be consistent with the style of Agilent signal sources. You can use either one of them. Since adding a waveform segment to a Multi-Pack license causes the license slot to enter the trial period of only 48 hours, pressing this key causes a confirmation dialog to be displayed to ensure you do want to add the waveform segment to the Multi-Pack. If you attempt to license a waveform that is already licensed using another slot an error is generated. . If current module is not “TRX1” module, the key will grey out, and error message is generated “–221 Setting conflict; Not allowed on current module. Goto “TRX1” to operate multi-pack license” when invoking SCPI.
Dependencies	This key is only available if the currently selected file is a secure waveform requiring a license, and there is at least one slot available within at least one multi-pack license. If the waveform highlighted is a secure waveform, but is already licensed, this key will be unavailable.
Initial S/W Revision	A.05.00

Segments on Hard Disk

Allows you access to the sub-menus for loading waveform segments from the hard disk into ARB memory. The default directory is: D: varb.

Pressing this key changes the current view to the Waveform Management View.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Initial S/W Revision	A.05.00

Load Segment To ARB Memory

Allows you to load the selected file into ARB memory. On the front panel you select the file for loading to the ARB memory by highlighting the desired file in the list. Using the SCPI command, you specify the file name on the HDD.

"NVWFM" (none-volatile storage) MSUS (Mass Storage Unit Specifier) is supported in the memory subsystem because the ARB memory cannot be accessed directly. Therefore, files must be downloaded to the instrument hard disk and then loaded into the ARB memory. "NVWFM" MSUS will be mapped to the default directory D: VARB. The SCPI command supports using either "NVWFM" MSUS or specifying a full path. For more information, see Memory Subsystem (Remote Command Only).

If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MMEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:LOAD <string>`
Example	:SOUR:RAD:ARB:LOAD "D: VARB\testwaveform.bin" or :SOUR:RAD:ARB:LOAD "NVWFM:testwaveform.bin"
Notes	Because loading the file involves a delay of unpredictable length, this command should be followed by the query *OPC?, which holds off subsequent commands until the loading operating is complete. <string> – specifies the path name of the file to load from the HDD into ARB memory. It could be a <full path + filename>, or <"NVWFM" MSUS + colon + filename>. When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load a file to ARB memory will be rejected with an error. When Include Source is Noand if there is insufficient free ARB memory to load the selected waveform, an error is generated. . If you specify a file over SCPI, but the file is not at the specified location, an error is generated. If you try to load a waveform file but the file contains less than 500 IQ sampes, an error is generated. If you try to load a Signal Studio waveform "*.wfm" which contains invalid waveform header, an error is generated. If the ARB is ON when you load afile to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished. ARB can be loaded into ARB memory even required licenses do not present on the instrument. In this

	case, a GUI only warning message –800, “Operation complete; Loaded <filename> successfully, but no license <required licenses> installed”. User can install required licenses according to <required licenses> string to license it, or multi-pack license it.
Initial S/W Revision	A.05.00

Load All To ARB Memory

Allows you to load all the segment files within the currently selected directory into ARB memory. If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:LOAD:ALL <string>`
Example	:SOUR:RAD:ARB:LOAD:ALL “D: varb”
Notes	<string> - specifies the directory on the HDD to load the files into ARB memory from. When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load all files from a directory to ARB memory is rejected with an error. When Include Source is No and there is insufficient free ARB memory to load all the waveforms, when the ARB memory is full, the copy ceases, and an error is generated. If you specify a directory over SCPI, but the directory does not exist, an error is generated. If the ARB is ON, a user then loads or deletes file to ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Change Directory...

Allows you to change the currently selected directory on the hard disk. Pressing this key opens a standard windows change directory dialog allowing you to select the new directory of interest.

The current directory is used for manually loading waveform segments into ARB memory for playback, and as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence or a list sequence.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Notes	No remote command, SCPIfront panel only.
Initial S/W Revision	A.05.00

Default Directory...

Allows you to change the default directory. It is used as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence, and as a search location for selecting waveforms using SCPI.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:DEFault:DIRectory <string>` `:SOURce:RADio:ARB: DEFault:DIRectory?`
Example	:SOUR:RAD:ARB:DEF:DIR “D:\ArbFiles” :SOUR:RAD:ARB:DEF:DIR?
State Saved	Persistent, survives a power cycle and a preset but not saved in the instrument state
Initial S/W Revision	A.05.00

Segments on Hard Disk

This key functions the same as "Segments on Hard Disk" on page 877.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Add Waveform
Initial S/W Revision	Prior to A.09.00

Load Segment To ARB Memory

This key functions the same as "Load Segment To ARB Memory" on page 877.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Add Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Load All To ARB Memory

This key functions the same as "Load All To ARB Memory" on page 878.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Add Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Change Directory ...

This key functions the same as "Change Directory..." on page 879.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Add Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Default Directory ...

This key functions the same as "Default Directory..." on page 879

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Add Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Replace Waveform

Pressing this key accesses the Replace Waveform submenu. It also changes the central display area to display the Multi-Pack License Waveform Add view.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses
Dependencies	This key is only available if the currently selected slot is in the trial state.
Initial S/W Revision	A.05.00

Replace Waveform

Allows you to replace the waveform in the currently selected slot with the waveform currently selected in the Multi-Pack License Waveform Add view.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Replace Waveform

Remote Command	`:SYSTem:LKEY:WAVeform:REPLace <int>, <string>`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:REPLace <int>, <string>`

Example	SYST:LKEY:WAV:REPL 1, “myotherwaveform.wfm” or :SYST:LIC:WAV:REPL 1, “myotherwaveform.wfm”
Notes	The second SCPI :SYSTem:LICense[:FPACk]:WAVeform:REPLace is provided to be consistent with the style of Agilent signal sources. You can use either one of them. If you attempt to license a waveform that is already licensed using another slot an error is generated. Waveform slot number <int> is positive. If you attmpt to input a slot number less than or equals 0, an error is generated. If current module is not “TRX1” module, the key will grey out, and error message is generated “–221 Setting conflict; Not allowed on current module. Goto “TRX1” to operate multi-pack license” when invoking SCPI.
Initial S/W Revision	A.05.00

Segments on Hard Disk

This key functions the same as "Segments on Hard Disk" on page 877.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Replace Waveform
Initial S/W Revision	Prior to A.09.00

Load Segment To ARB Memory

This key functions the same as "Load Segment To ARB Memory" on page 877.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Replace Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Load All To ARB Memory

This key functions the same as "Load All To ARB Memory" on page 878.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Replace Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Change Directory ...

This key functions the same as "Change Directory..." on page 879.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Replace Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Default Directory ...

This key functions the same as "Default Directory..." on page 879

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Replace Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Clear Waveform from Slot

Allows you to clear the waveform from the selected slot.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses

Remote Command	`:SYSTem:LKEY:WAVeform:CLEar <int>`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:CLEar <int>`

Example	SYST:LKEY:WAV:CLE 1 or :SYST:LIC:WAV:CLE 1
Notes	The second SCPI :SYSTem:LICense[:FPACk]:WAVeform:CLEar is provided to be consistent with the style of Agilent signal sources. You can use either one of them. Waveform slot number <int> is positive. If you attmpt to input a slot number less than or equals 0, an error is generated. If current module is not "TRX1" module, the key will grey out, and error message is generated "–221 Setting conflict; Not allowed on current module. Goto "TRX1" to operate multi-pack license" when invoking SCPI.
Dependencies	This key is only available if the currently selected slot is in the trial state.
Initial S/W Revision	A.05.00

Lock Waveform in Slot

If the selected slot is in the trial state or the lock required state, the waveform that occupies the slot is locked and permanently licensed.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses

Remote Command	`:SYSTem:LKEY:WAVeform:LOCK <int>`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:LOCK <int>`

Example	SYST:LKEY:WAV:LOCK 1 or SYST:LIC:WAV:LOCK 1
Notes	The second SCPI :SYSTem:LICense[:FPACk]:WAVeform:LOCK is provided to be consistent with the style of Agilent signal sources. You can use either one of them. Waveform slot number <int> is positive. If you attmpt to input a slot number less than or equals 0, an error is generated. If current module is not "TRX1" module, the key will grey out, and error message is generated "–221 Setting conflict; Not allowed on current module. Goto "TRX1" to operate multi-pack license" when invoking SCPI.
Dependencies	This key is only available if the currently selected slot is in the trial state or the lock required state.
Initial S/W Revision	A.05.00

Slot Status Query (Remote Command Only)

Returns the status of the specified slot.

Remote Command	`:SYSTem:LKEY:WAVeform:STATus? <int>`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:STATus? <int>`

Example	:SYST:LKEY:WAV:STAT? 1 <"Locked" or :SYST:LIC:WAV:STAT? 1 <"Locked"
Notes	The second SCPI :SYSTem:LICense[:FPACk]:WAVeform:STATus is provided to be consistent with the style of Agilent signal sources. You can use either one of them. Waveform slot number <int> is positive. If you attmpt to input a slot number less than or equals 0, an error is generated. Result type is string. If input slot number exceeds total available slot number, “Nonexistent” is returned.
Range	"Locked" | "Available" | “Trail” | “LockRequired” | “Nonexistent”
Initial S/W Revision	A.05.00

Slots Free Query (Remote Command Only)

Returns the number of license slots free.

Remote Command	`:SYSTem:LKEY:WAVeform:FREE?`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:FREE?`

Example	:SYST:LKEY:WAV:FREE? or :SYST:LIC:WAV:FREE?
Notes	The second SCPI :SYSTem:LICense[:FPACk]:WAVeform:FREE is provided to be consistent with the style of Agilent signal sources. You can use either one of them.
Initial S/W Revision	A.05.00

Slot Used Query (Remote Command Only)

Returns the number of license slots used.

Remote Command	`:SYSTem:LKEY:WAVeform:USED?`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:USED?`

Example	:SYST:LKEY:WAV:USED?

	or :SYST:LIC:WAV:USED?
Notes	The second SCPI :SYSTem:LICense[:FPACk]:WAVeform:USED is provided to be consistent with the style of Agilent signal sources. You can use either one of them.
Initial S/W Revision	A.05.00

Slot Waveform Name Query (Remote Command Only)

Returns the waveform name of the specified slot

Remote Command	`:SYSTem:LKEY:WAVeform:NAME? <int>`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:NAME? <int>`

Example	:SYST:LKEY:WAV:NAME? 1 <"CDMA2K_22.wfm" or :SYST:LIC:WAV:NAME? 1 <"CDMA2K_22.wfm"
Notes	Waveform slot number <int> is positive. If you attmpt to input a slot number less than or equals 0, an error is generated. Result type is string. If input slot number exceeds total available slot number, “Nonexistent” is returned. If no waveform stored in the specified slot, then empty string is returned.
Initial S/W Revision	A.12.00

Slot Waveform Unique ID Query (Remote Command Only)

Returns the waveform unique ID of the specified slot

Remote Command	`:SYSTem:LKEY:WAVeform:UID? <int>`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:UID? <int>`

Example	:SYST:LKEY:WAV:UID? 2 <"1346752140" or :SYST:LIC:WAV:UID? 2 <"1346752140"
Notes	Waveform slot number <int> is positive. If you attmpt to input a slot number less than or equals 0, an error is generated. Result type is string. If input slot number exceeds total available slot number, “Nonexistent” is returned.

	If no waveform stored in the specified slot, then “0” is returned
Initial S/W Revision	A.12.00

Locked Waveform Name List Query (Remote Command Only)

Returns the waveform name list of locked.

Remote Command	`:SOURce:RADio:ARB:MPLicensed:NAME:LOCKed?`
Example	SOUR:RAD:ARB:MPL:NAME:LOCKed? <"CDMA2K_27.wfm", "GSM_MCS1.WFM", "c2kWfm.wfm"
Initial S/W Revision	A.11.00

Locked Waveform Unique ID List Query (Remote Command Only)

Returns the waveform unique id list of locked.

Remote Command	`:SOURce:RADio:ARB:MPLicensed:UID:LOCKed?`
Example	SOUR:RAD:ARB:MPL:UID:LOCKed? <"2996927136","3812603511","3710986266"
Notes	Each Signal Studio waveform has a unique id recorded in header. So if the unique ids are same, that means they are same one waveform. So besides SCPI to query locked waveform name list, also provide a SCPI to query locked waveform unique id list
Initial S/W Revision	A.11.00

Marker Utilities

Allows access to the marker utilities sub-menus.

Key Path	Source, Modulation Setup, ARB
Initial S/W Revision	A.05.00

Marker Polarity

Allows access to the marker polarity sub-menu, which allows you to specify the polarity for the four markers. For a positive polarity, the marker signal is high during the marker points. For a negative marker polarity, the marker signal is high during the period of no marker points.

Key Path	Source, Modulation Setup, ARB, Marker Utilities
Initial S/W Revision	A.05.00

Mkr 1 Polarity

Allows you to set the polarity of marker 1.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Polarity
Remote Command	`:SOURce:RADio:ARB:MPOLarity:MARKer1 POSitive|NEGative` `:SOURce:RADio:ARB:MPOLarity:MARKer1?`
Example	:SOUR:RAD:ARB:MPOL:MARK1 NEG
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The marker polarity is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the marker polarity is updated with the value from the header file. The marker polarity will remain unchanged if the newly selected waveform does not have an associated header file.
Preset	Pos
Range	Neg | Pos
Initial S/W Revision	A.05.00

Mkr 2 Polarity

Allows you to set the polarity of marker 2.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Polarity
Remote Command	`:SOURce:RADio:ARB:MPOLarity:MARKer2 POSitive|NEGative` `:SOURce:RADio:ARB:MPOLarity:MARKer2?`
Example	:SOUR:RAD:ARB:MPOL:MARK2 NEG
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The marker polarity is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the marker polarity is updated with the value from the header file. The marker polarity will remain unchanged if the newly selected waveform does not have an associated header file.
Preset	Pos
Range	Neg | Pos
Initial S/W Revision	A.05.00

Mkr 3 Polarity

Allows you to set the polarity of marker 3.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Polarity
Remote Command	`:SOURce:RADio:ARB:MPOLarity:MARKer3 POSitive|NEGative` `:SOURce:RADio:ARB:MPOLarity:MARKer3?`
Example	:SOUR:RAD:ARB:MPOL:MARK3 NEG
Dependencies	When a new waveform is selected for playback the settings contained within the associated

	waveform header file are applied to the ARB. The marker polarity is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the marker polarity is updated with the value from the header file. The marker polarity will remain unchanged if the newly selected waveform does not have an associated header file.
Preset	Pos
Range	Neg | Pos
Initial S/W Revision	A.05.00

Mkr 4 Polarity

Allows you to set the polarity of marker 4.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Polarity
Remote Command	`:SOURce:RADio:ARB:MPOLarity:MARKer4 POSitive|NEGative` `:SOURce:RADio:ARB:MPOLarity:MARKer4?`
Example	:SOUR:RAD:ARB:MPOL:MARK4 NEG
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The marker polarity is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the marker polarity is updated with the value from the header file. The marker polarity will remain unchanged if the newly selected waveform does not have an associated header file.
Preset	Pos
Range	Neg | Pos
Initial S/W Revision	A.05.00

Marker Routing

Allows access to the marker routing sub-menus, which allow you to specify where the marker events are routed. It should be noted that the markers can also be routed to Trigger 1 Out and Trigger 2 Out, however this must be set up using the menus accessed by pressing the “Trigger” hard key.

Key Path	Source, Modulation Setup, ARB, Marker Utilities
Initial S/W Revision	A.05.00

Pulse/RF Blank

Allows you to select which marker is used for the pulse/RF blanking function. The pulse/RF blanking function blanks the RF when the marker signal goes low. The marker polarity determines when the marker signal is high. For a positive polarity, this is during the marker points. For a negative polarity, this is when there are no marker points.

Marker points should be set before using this function. Enabling this function without setting maker points may create a continuous low or high signal, dependant on the marker polarity. This causes either no RF output, or a continuous RF output.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing
Remote Command	`:SOURce:RADio:ARB:MDEStination:PULSe NONE|M1|M2|M3|M4` `:SOURce:RADio:ARB:MDEStination:PULSe?`
Example	:SOUR:RAD:ARB:MDES:PULS NONE
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The pulse/RF blanking setting is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the pulse/RF blanking setting is updated with the value from the header file. The pulse/RF blanking setting will remain unchanged if the newly selected waveform does not have an associated header file.
Range	None | M1 | M2 | M3 | M4
Initial S/W Revision	A.05.00

None

Sets no marker to be used for the pulse/RF blanking function, essentially turning the RF blanking function off.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, Pulse/RF Blank
Example	:SOUR:RAD:ARB:MDES:PULS NONE
Initial S/W Revision	A.05.00

Marker 1

Sets marker 1 to be used for the pulse/RF blanking function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, Pulse/RF Blank
Example	:SOUR:RAD:ARB:MDES:PULS M1
Initial S/W Revision	A.05.00

Marker 2

Sets marker 2 to be used for the pulse/RF blanking function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, Pulse/RF Blank
Example	:SOUR:RAD:ARB:MDES:PULS M2
Initial S/W Revision	A.05.00

Marker 3

Sets marker 3 to be used for the pulse/RF blanking function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, Pulse/RF Blank
Example	:SOUR:RAD:ARB:MDES:PULS M3
Initial S/W Revision	A.05.00

Marker 4

Sets marker 4 to be used for the pulse/RF blanking function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, Pulse/RF Blank
Example	:SOUR:RAD:ARB:MDES:PULS M4
Initial S/W Revision	A.05.00

ALC Hold

Allows you to specify which marker is routed for use within the ALC hold function. The ALC hold marker function holds the ALC circuitry at the average value of the sample points set by the marker.

The ALC hold function operates during the low periods of the marker signal. The marker polarity determines when the marker signal is high. For positive polarity, this is during the marker points. For a negative polarity, this is when there are no maker points.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing
Remote Command	`:SOURce:RADio:ARB:MDEStination:ALCHold NONE|M1|M2|M3|M4` `:SOURce:RADio:ARB:MDEStination:ALCHold?`
Example	:SOUR:RAD:ARB:MDES:ALCH NONE
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The ALC hold setting is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the ALC hold setting is updated with the value from the header file. The ALC hold setting will remain unchanged if the newly selected waveform does not have an associated header file.
Range	None | M1 | M2 | M3 | M4
Initial S/W Revision	A.05.00

None

Sets no marker to be used for the ALC hold function, essentially turning the ALC hold function off.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, ALC Hold
Example	:SOUR:RAD:ARB:MDES:PULS NONE
Initial S/W Revision	A.05.00

Marker 1

Sets marker 1 to be used for the ALC hold function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, ALC Hold
Example	:SOUR:RAD:ARB:MDES:PULS M1
Initial S/W Revision	A.05.00

Marker 2

Sets marker 2 to be used for the ALC hold function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, ALC Hold
Example	:SOUR:RAD:ARB:MDES:PULS M2
Initial S/W Revision	A.05.00

Marker 3

Sets marker 3 to be used for the ALC hold function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, ALC Hold
Example	:SOUR:RAD:ARB:MDES:PULS M3
Initial S/W Revision	A.05.00

Marker 4

Sets marker 4 to be used for the ALC hold function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, ALC Hold
Example	:SOUR:RAD:ARB:MDES:PULS M4
Initial S/W Revision	A.05.00

Header Utilities

Allows access to the header utilities sub-menu. Pressing this key also causes the central display area to change to display the File Header Information view.

Key Path	Source, Modulation Setup, ARB
Dependencies	This key is only available if there is currently a waveform selected for playback. If no waveform is selected, the key is grayed out.
Initial S/W Revision	A.05.00

Clear Header

Allows you to clear the header information from the file header associated with the currently selected waveform.

Key Path	Source, Modulation Setup, ARB, Header Utilities
Remote Command	`:SOURce:RADio:ARB:HEADer:CLEar`
Example	:SOUR:RAD:ARB:HEAD:CLE
Notes	Attempting to clear the header details via SCPI when no waveform was selected for playback will generate an error.
Initial S/W Revision	A.05.00

Save Setup To Header

Allows you to save new file header information details to the file.

Key Path	Source, Modulation Setup, ARB, Header Utilities
Remote Command	`:SOURce:RADio:ARB:HEADer:SAVE`
Example	:SOUR:RAD:ARB:HEAD:SAVE
Notes	Attempting to save the header details via SCPI when no waveform was selected for playback will generate an error.
Initial S/W Revision	A.05.00

Query Waveform Unique ID (Remote Command Only)

Each Signal Studio waveform contains a unique waveform ID, which recorded in the header. This command allows you to query the unique waveform ID from the header. This is a SCPI only command. User can also checkError! Reference source not found. for waveform unique ID display.

Remote Command	`:MMEMory:HEADer:ID? "<file name>"`
Example	:MMEM:HEAD:ID? “test.wfm” (query the waveform already loaded into the ARB memory) :MMEM:HEAD:ID? “D: VARB\test.wfm” (query the waveform on the hard disk by absolute path) :MMEM:HEAD:ID? “NVWFM:test.wfm” (query the waveform on the hard disk by MSUS)
Notes	SCPI query only. The queried waveform file can be in ARB memory, or on hard disk. If want to query ARB in ARB memory, then give out the file name directly. If want to query ARB on the hard disk, then absolute file path or MSUS should be given along with the file name. The valid MSUS is “NVWFM” which is mapped to D: VARB on hard disk. If the file cannot be found in ARB memory or on hard disk, an error is generated.and value –1 is returned
Initial S/W Revision	A.09.00

Bus Trigger Command (Remote Command Only)

Used to initiate an immediate trigger event if the trigger source is set to Bus.

Remote Command	`:SOURce:RADio:ARB:TRIGger:INITiate`
Example	:SOUR:RAD:ARB:TRIG:INIT
Initial S/W Revision	A.05.00

AM

Allows access to the menu for configuring the Amplitude Modulation.

Key Path	Source, Modulation Setup
Initial S/W Revision	A.05.00

AM

Enables or disables the amplitude modulation.

Turning AM on when another modulation format is already on results in the previous modulation format being turned off and the generation of an error.

Key Path	Source, Modulation Setup, AM
Remote Command	`:SOURce:AM:STATe` `:SOURce:AM:STATe?`
Example	:SOUR:AM:STAT OFF
Preset	Off
Range	On | Off
Initial S/W Revision	A.05.00

AM Depth

Allows you to set the amplitude modulation depth in percent.

Key Path	Source, Modulation Setup, AM
Remote Command	`:SOURce:AM[:DEPTh][:LINear]` `:SOURce:AM[:DEPTh][:LINear]?`
Example	:SOUR:AM 0.1
Preset	0.1 %
Min	0.1 %
Max	95.0 %
Initial S/W Revision	A.05.00

AM Rate

Allows you to set the internal amplitude modulation rate.

Key Path	Source, Modulation Setup, AM
Remote Command	:SOURce:AM:INTernal:FREQuency :SOURce:AM:INTernal:FREQuency?
Example	:SOUR:AM:INT:FREQ 40.0 Hz
Preset	400.0 Hz
Min	10 Hz
Max	40 kHz
Initial S/W Revision	A.05.00

FM

Allows access to the menu for configuring the frequency modulation.

Key Path	Source, Modulation Setup
Initial S/W Revision	A.05.00

FM

Enables or disables the frequency modulation.

Turning FM on when another modulation format is already on results in the previous modulation format being turned off and the generation of an error.

Key Path	Source, Modulation Setup, FM
Remote Command	:SOURce:FM:STATe :SOURce:FM:STATe?
Example	:SOUR:FM:STAT OFF
Preset	Off
Range	On | Off
Initial S/W Revision	A.05.00

FM Deviation

Allows you to set the frequency modulation deviation.

Key Path	Source, Modulation Setup, FM

Remote Command	:SOURce:FM[:DEViation] :SOURce:FM[:DEViation]?
Example	:SOUR:FM 1.00 kHz
Preset	1.00 Hz
Min	1.00 Hz
Max	100.00 kHz
Initial S/W Revision	A.05.00

FM Rate

Allows you to set the internal frequency modulation rate.

Key Path	Source, Modulation Setup, FM
Remote Command	:SOURce:FM:INTernal:FREQuency :SOURce:FM:INTernal:FREQuency?
Example	:SOUR:FM:INT:FREQ 40.0 Hz
Preset	400.0 Hz
Min	10 Hz
Max	40 kHz
Initial S/W Revision	A.05.00

PM

Allows access to the menu for configuring the phase modulation.

Key Path	Source, Modulation Setup
Initial S/W Revision	A.05.00

PM

Enables or disables the phase modulation.

Turning PM on when another modulation format is already on results in the previous modulation format being turned off and the generation of an error.

Key Path	Source, Modulation Setup, PM
Remote Command	:SOURce:PM:STATe :SOURce:PM:STATe?
Example	:SOUR:PM:STAT OFF

Preset	Off
Range	On | Off
Initial S/W Revision	A.05.00

PM Deviation

Allows you to set the phase modulation deviation.

Key Path	Source, Modulation Setup, PM
Remote Command	`:SOURce:PM[:DEViation]` `:SOURce:PM[:DEViation]?`
Example	:SOUR:PM 1.00 rad
Preset	0.1 rad
Min	0.1 rad
Max	20.0 rad
Initial S/W Revision	A.05.00

PM Rate

Allows you to set the internal phase modulation rate.

Key Path	Source, Modulation Setup, PM
Remote Command	`:SOURce:PM:INTernal:FREQuency` `:SOURce:PM:INTernal:FREQuency?`
Example	:SOUR:PM:INT:FREQ 40.0 Hz
Preset	400.0 Hz
Min	10 Hz
Max	40 kHz
Initial S/W Revision	A.05.00

List Sequencer

Allows you access to the sub-menus for configuring the list sequencer.

List sequences allows you to enter frequencies and amplitudes at unequal intervals in nonlinear ascending, descending or random order. Each step within the list can also include its own waveform file for playback, step duration, trigger event and trigger output.

The complexities involved in configuring the list sequencer do not lend itself to manual configuration; hence the manual configuration for this feature is limited. For easier configuration of the list sequencer, it is recommended that you use either SCPI or load a tab delimited file containing the setup parameters in a

tabular form. The details of the SCPI for configuring the list sequencer can be found in "Step Configuration (Remote Command Only)" on page 884.

Once the List Sequencer has been configured using the front panel, SCPI, or loading in a tab delimited file, the sequence must be initiated using the front panel Initiate Sequence key or the corresponding SCPI command.

Key Path	Source
Initial S/W Revision	A.05.00

Sequencer

Allows you to set the state of the list sequencer. When the list sequencer is on, the source is outputting the sequence defined by the sequencer. When the list sequencer is off, the source outputs a single waveform segment or sequence (independent mode) at a single frequency and amplitude.

Key Path	Source, List Sequencer
Remote Command	`:SOURce:LIST[:STATe] ON|OFF|1|0` `:SOURce:LIST[:STATe]?`
Example	:SOUR:LIST OFF
Notes	When the sequencer is set to ON, the list sequencer controls the output of the source.
Couplings	When in Sequence Analyzer mode and the list sequencer state is Off, Include Source is forced to No, and the Include Source key is grayed out. When in Sequence Analyzer mode and the list sequencer state is On, Include Source is available to set. And, an ARB memory related operation, like load or delete will be rejected.
Preset	Off
Range	On | Off
Initial S/W Revision	A.05.00

Initiate Sequence

Pressing this key arms the sequence for single execution. Once the sequence is armed the source begins the sequence as soon as the trigger is received. If the trigger is set to Free Run, the sequence starts immediately.

Key Path	Source, List Sequencer
Remote Command	`:SOURce:LIST:TRIGger[:IMMediate]`
Example	:SOUR:LIST:TRIG
Notes	When in Sequence Analyzer mode and Include Source is Yes, the Initiate list sequencer operation is rejected, and the key is grayed out, since source list sequence request is sent to physics via Parallel batch by sequence analyzer. If the file needed by the sequencer is not already in ARB memory, the sequence cannot be initiated

	and an error will be generated. There is a blocking SCPI query which can be used to query if source list sequence being initiated successfully or not. (see "Query List Sequence Initiation Armed Status (Remote Command Only)" on page 895 Query Source List Sequence Armed Status)
Dependencies	Under the Sequence Analyzer Mode, if Meas Setup->Include Source is set to YES, Source->List Sequencer->Initiate Sequence is disabled.
Initial S/W Revision	A.05.00

List Sequencer Setup

Allows you access to the list sequencer setup menus.

Key Path	Source, List Sequencer

Number of Steps

Allows you to specify the number of steps within the list sequence.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:NUMBer:STEPs <integer>` `:SOURce:LIST:NUMBer:STEPs?`
Example	:SOUR:LIST:NUMB:STEP 1
Notes	Increasing the number of steps creates additional steps at the end of the list, with all the settings within the steps set to their default values. Decreasing the number of steps removes steps from the end of the list. The settings within the removed steps are not reset. This means that increasing the number of steps again would allow you to retrieve these steps.
Dependencies	The Step Count parameter is increased or decreased when you insert or delete a point from within the GUI interface to the sequencer.
Preset	1
Min	1
Max	1000
Initial S/W Revision	A.05.00

Current Step

Allows you to select the step number you wish to view or edit.

Key Path	Source, List Sequencer, List Sequencer Setup

Notes	No remote command, front panel only.
Preset	1
Min	1
Max	Step Count
Initial S/W Revision	A.05.00

Insert Step Before

Allows you to insert a new step, containing default values, before the currently selected step. Inserting a step will automatically increase the Step Count parameter by 1. If sequence already reaches upper limit of 1000 steps, then insert more step will be rejected and popup error –221, “Setting Conflict; Cannot insert more steps, maximum number of steps reached”

Key Path	Source, List Sequencer, List Sequencer Setup
Notes	No remote command, front panel only. If the list already contains the maximum limit of 1000 steps, no operation will be made after pressing this key.
Initial S/W Revision	A.05.00

Delete Step

Allows you to delete the current step. Deleting a step will automatically decrease the Step Count parameter by 1. If sequence only has one step left, delete step will be rejected and popup error –221, “Setting conflict; Cannot delete current step, minimum number of steps reached”

Key Path	Source, List Sequencer, List Sequencer Setup
Notes	No remote command, Front Panel key only. If the list already contains the minimum limit of 1 step, no operation will be made after pressing this key
Initial S/W Revision	A.05.00

Clear List

Allows you to clear the list. Clearing the list sets the number of steps to the default value of 1 and sets the parameters for the only step to their default values.

Key Path	Source, List Sequencer, List Sequencer Setup
Initial S/W Revision	A.05.00

Step Trigger

Allows access to the sub-menu for selecting the trigger input for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:INPut:TRIGger IMMediate | INTernal | EXTernal2 | KEY | BUS | EXTernal4` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:INPut:TRIGger?`
Example	:SOUR:LIST:STEP2:SET:INP:TRIG BUS :SOUR:LIST:STEP2:SET:INP:TRIG?
Notes	SCPI is supported after A.09.40
Preset	Free Run
Range	Free Run | Internal | Manual (Trigger Key) | Bus | External 2| EXTernal4
Initial S/W Revision	A.05.00

Free Run

Sets the trigger input for the current step to Free Run.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Trigger
Example	:SOUR:LIST:STEP2:SET:INP:TRIG IMM
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Internal

Sets the trigger input for the current step to Internal.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Trigger
Example	:SOUR:LIST:STEP2:SET:INP:TRIG INT
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Manual (Trigger Key)

Sets the trigger input for the current step to Manual (Trigger Key). Any step in the sequence set to Manual will cause the sequence execution to stop until the manual trigger key is pressed. Sending the Bus Trigger SCPI command will have no effect. At any point in the sequence where the list sequencer is paused waiting for a software trigger, a pop up dialog is displayed until the trigger event occurs.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Trigger
Example	:SOUR:LIST:STEP2:SET:INP:TRIG KEY
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Bus

Sets the trigger input for the current step to Bus. Any step in the sequence set to Bus will cause the sequence execution to stop until the Bus Trigger SCPI command is sent. Pressing the manual trigger key has no effect. At any point in the sequence where the list sequencer is paused waiting for a software trigger, a pop up dialog is displayed until the trigger event occurs.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Trigger
Example	:SOUR:LIST:STEP2:SET:INP:TRIG BUS
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

External 2

Sets the trigger input for the current step to External 2.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Trigger
Example	:SOUR:LIST:STEP2:SET:INP:TRIG EXT2
Notes	SCPI is supported after A.09.40
Notes	Note: When on E6640A, trigger 2 is a bi-directional trigger port. So when trigger 2 has been configured as OUTPUT type, choosing External 2 as the input trigger for the current step will generate error.
Initial S/W Revision	A.05.00

Transition Time

Allows you to specify the transition time for the current step.

The transition time is the amount of time allowed for the source to settle at the current frequency or amplitude value.

Transition Time should not be taken as additional time before or inside the Step Duration. You can set a value for the settling time to allow the source output frequency or amplitude to become stable. Make sure that during this period of time, you do not use the source output signal.

The following table lists recommended values for appropriate settling times to allow for changes within the source.

Value Changed	Recommended Transition Time
Frequency	500 µs
Amplitude	100 µs to within 0.1 dB 20 µs to within 1.0 dB

If the Transition Time value is shorter than the time necessary for the hardware to settle and a List Sequence is initiated, a warning is generated.

If the Transition Time value is longer than the Step Duration, an error is generated when initiating a source list sequence. For source list sequence, transition time is included in the step duration length. If the Transition Time value is longer than the Step Duration Time, the real step duration length is extended to equal the transition time and cause a timing shift.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:TRANsition:TIME <time>` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:TRANsition:TIME?`
Example	:SOUR:LIST:STEP2:SET:TRAN:TIME 1ms :SOUR:LIST:STEP2:SET:TRAN:TIME?
Notes	SCPI is supported after A.09.40
Preset	1.0 ms
Min	0.0 ms
Max	4.0 ks
Initial S/W Revision	A.05.00

Radio Setup

Allows you access to the sub-menus for setting up the radio standard, band, and radio band link direction for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup
Notes	No remote command, front panel only.
Initial S/W Revision	A.05.00

Radio Standard

Allows access to the sub-menus for selecting the radio standard and the associated radio band for use in the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:RADio:BAND NONE | PGSM | EGSM | RGSM | DCS1800 | PCS1900 | TGSM810 | GSM450 | GSM480 | GSM700 | GSM850 | BANDI | BANDII | BANDIII | BANDIV | BANDV | BANDVI | BANDVII | BANDVIII | BANDIX | BANDX | BANDXI | BANDXII | BANDXIII | BANDXIV | BANDXIX | USCELL | USPCS | JAPAN | KOREAN | NMT | IMT2K | UPPER | SECOND | PAMR400 | PAMR800 | IMTEXT | PCS1DOT9G | AWS | US2DOT5G | PUBLIC | LOWER | NONE | BAND1 | BAND2 | BAND3 | BAND4 | BAND5 | BAND6 | BAND7 | BAND8 | BAND10 | BAND11 | BAND12 | BAND13 | BAND14 | BAND17 | BAND18 | BAND19 | BAND20 | BAND21 | BAND24 | BAND25 | BAND26 | BAND27 | BAND28 | BAND31 | BAND33 | BAND34 | BAND35 | BAND36 | BAND37 | BAND38 |`

	BAND39 | BAND40 | BAND41 | BAND42 | BAND43 | BAND44 | BANDA | BANDB | BANDC | BANDD | BANDE | BANDF :SOURce:LIST:STEP[1]|2|3…1000:SETup: RADio:BAND?
Example	:SOUR:LIST:STEP2:SET:RAD:BAND PGSM :SOUR:LIST:STEP2:SET:RAD:BAND?
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

None

Selects no radio standard for use on the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard
Example	:SOUR:LIST:STEP2:SET:RAD:BAND NONE
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

GSM/EDGE

Pressing this key once selects GSM/EDGE as the radio standard and the current GSM/EDGE band as the active channel band. Pressing this key again allows access to the sub-menus for selecting a different GSM/EDGE band.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard
Initial S/W Revision	A.05.00

P-GSM

Selects P-GSM as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

E-GSM

Selects E-GSM as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

R-GSM

Selects R-GSM as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

DCS 1800

Selects DCS 1800 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

PCS 1900

Selects PCS 1900 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

GSM 450

Selects GSM 450 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

GSM 480

Selects GSM 480 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

GSM 850

Selects GSM 850 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

GSM 700

Selects GSM 700 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

T-GSM 810

Selects T-GSM 810 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

WCDMA

Pressing this key once selects WCDMA as the radio standard and the current WCDMA band as the active channel band. Pressing this key again allows access to the sub-menus for selecting a different WCDMA band.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard
Initial S/W Revision	A.05.00

Band I

Selects Band I as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band II

Selects Band II as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band III

Selects Band III as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band IV

Selects Band IV as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band V

Selects Band V as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band VI

Selects Band VI as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band VII

Selects Band VII as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band VIII

Selects Band VIII as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band IX

Selects Band IX as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band X

Selects Band X as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band XI

Selects Band XI as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band XII

Selects Band XII as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band XIII

Selects Band XIII as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band XIV

Selects Band XIV as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band XIX

Selects Band XIX as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.14.50

CDMA 2000 / 1xEVDO

Pressing this key once selects CDMA 2000/1xEVDO as the radio standard and the current CDMA 2000/1xEVDO band as the active channel band. Pressing this key again allows access to the sub-menus for selecting a different CDMA 2000/1xEVDO band.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard
Initial S/W Revision	A.05.00

US CELL

Selects US Cell as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

US PCS

Selects US PCS as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

Japan Cell

Selects Japan Cell as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

Korean PCS

Selects Korean PCS as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

NMT 450

Selects NMT 450 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

IMT 2000

Selects IMT 2000 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

Upper 700

Selects Upper 700 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

Secondary 800

Selects Secondary 800 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

400 Euro PAMR

Selects 400 Euro PAMR as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

800 PAMR

Selects 800 PAMR as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

2.5GHz IMT EXT

Selects 2.5 GHz IMT EXT as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

US PCS 1.9GHz

Selects US PCS 1.9 GHz as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

AWS

Selects AWS as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

US 2.5GHz

Selects US 2.5 GHz as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

700 Public Safety

Selects 700 Public Safety as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

C2K Lower 700

Selects C2K Lower 700 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

LTE

Pressing this key once selects LTE FDD as the radio standard and the current LTE FDD band as the active channel band. Pressing this key again allows access to the sub-menus for selecting a different LTE FDD band.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard
Initial S/W Revision	A.09.50

BAND 1

Selects BAND 1 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 2

Selects BAND 2 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 3

Selects BAND 3 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 4

Selects BAND 4 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 5

Selects BAND 5 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 6

Selects BAND 6 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 7

Selects BAND 7 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 8

Selects BAND 8 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 9

Selects BAND 9 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 10

Selects BAND 10 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 11

Selects BAND 11 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 12

Selects BAND 12 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 13

Selects BAND 13 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 14

Selects BAND 14 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 17

Selects BAND 17 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 18

Selects BAND 18 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 19

Selects BAND 19 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 20

Selects BAND 20 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 21

Selects BAND 21 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 24

Selects BAND 24 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 25

Selects BAND 25 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 26

Selects BAND 26 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.12.53

BAND 27

Selects BAND 27 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.14.00

BAND 28

Selects BAND 28 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.14.00

BAND 31

Selects BAND 31 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.14.00

LTE TDD

Sets LTE TDD as the radio standard for use and accesses the LTE TDD specific channel band sub-menus..

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.11.50

BAND 33

Selects BAND 33 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND33
Initial S/W Revision	A.11.50

BAND 34

Selects BAND 34 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND34
Initial S/W Revision	A.11.50

BAND 35

Selects BAND 35 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND35
Initial S/W Revision	A.11.50

BAND 36

Selects BAND 36 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND36
Initial S/W Revision	A.11.50

BAND 37

Selects BAND 37 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND37
Initial S/W Revision	A.11.50

BAND 38

Selects BAND 38 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND38
Initial S/W Revision	A.11.50

BAND 39

Selects BAND 39 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND39
Initial S/W Revision	A.11.50

BAND 40

Selects BAND 40 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND40
Initial S/W Revision	A.11.50

BAND 41

Selects BAND 41 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND41
Initial S/W Revision	A.11.50

BAND 42

Selects BAND 42 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND42
Initial S/W Revision	A.11.50

BAND 43

Selects BAND 43 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND43
Initial S/W Revision	A.11.50

BAND 44

Selects BAND 44 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE TDD
Initial S/W Revision	A.14.00

TDSCDMA

Sets TDSCDMA as the radio standard for use and accesses the TDSCDMA specific channel band sub-menus..

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.11.50

BAND A

Selects BAND A as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDA
Initial S/W Revision	A.11.50

BAND B

Selects BAND B as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDB
Initial S/W Revision	A.11.50

BAND C

Selects BAND C as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDC
Initial S/W Revision	A.11.50

BAND D

Selects BAND D as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDD
Initial S/W Revision	A.11.50

BAND E

Selects BAND E as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA

Example	:SOUR:FREQ:CHAN:BAND BANDE
Initial S/W Revision	A.11.50

BAND F

Selects BAND F as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDF
Initial S/W Revision	A.11.50

Radio Band Link

Allows you to specify the radio band link direction for the steps within the list sequence. The link is used in conjunction with the channel band and channel number to determine the output frequency.

When set to “Uplink”, the source will calculate the uplink frequency according to an uplink formula together with selected channel band and channel number. When set to “Downlink”, the source will calculate the downlink frequency according to a downlink formula together with selected channel band and channel number.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:RADio:BAND:LINK DOWN|UP` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:RADio:BAND:LINK?`
Example	:SOUR:LIST:STEP2:SET:RAD:BAND:LINK UP :SOUR:LIST:STEP2:SET:RAD:BAND:LINK?
Notes	SCPI is supported after A.09.40
Preset	DOWN
Range	DOWN | UP
Initial S/W Revision	A.05.00

Channel

Allows you to specify the frequency of the current step via a channel number.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:CNFRequency <double>` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:CNFRequency?`
Example	:SOUR:LIST:STEP2:SET:CNFR 124 :SOUR:LIST:STEP2:SET:CNFR?
Notes	SCPI is supported after A.09.40.

	This SCPI is used to setup channel number or frequency setting, according to current Radio Band setting. If Radio Band is “NONE”, then it’s frequency. If Radio Band is not “NONE”, then it’s channel number.
Couplings	The channel number is coupled to the step frequency value. When the step frequency value is changed, the channel number will increase or decrease to match the new step frequency. If the step frequency is not at an exact match for a channel number, the nearest channel number is displayed, along with a greater than, or less than sign to indicate the frequency is above or below the channel number.
Preset	1
Min	0 (Please refer to for valid ranges.)
Max	10838 (Please refer to for valid ranges.)
Initial S/W Revision	A.05.00

Frequency

Allows you to specify a frequency value for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:CNFRequency <double>` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:CNFRequency?`
Example	:SOUR:LIST:STEP2:SET:CNFR 1GHz :SOUR:LIST:STEP2:SET:CNFR?
Notes	SCPI is supported after A.09.40. This SCPI is used to setup channel number or frequency setting, according to current Radio Band setting. If Radio Band is “NONE”, then it’s frequency. If Radio Band is not “NONE”, then it’s channel number.
Couplings	The frequency value is coupled to the channel band and number for the step, such that updates to the radio band and channel number will update the frequency value to the corresponding absolute frequency. The reverse is also true, changing the frequency value causes the value of the channel number to be updated.
Preset	1.00 GHz
Min	10.00 MHz
Max	Hardware Dependant: Option 503 = 3.6 GHz Option 504 = 3.9 GHz Option 506 = 6.00 GHz
Initial S/W Revision	A.05.00

Power

Allows you to specify a power value for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:AMPLitude <double>` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:AMPLitude?`
Example	:SOUR:LIST:STEP2:SET:AMPL –50dBm :SOUR:LIST:STEP2:SET:AMPL?
Notes	SCPI is supported after A.09.40
Notes	Amplitude corrections can be specified for use with the source. In the event of amplitude corrections being applied, the valid ranges for the RF power do not change dependant on the current amplitude correction setting. Instead, if the combination of RF power + amplitude correction is higher or lower than the source output range, the Source Unleveled bit is set and the “Source Unleveled” indicator will appear on status panel to indicate that the source cannot maintain the output power that has been requested. The multiport adapter RFIO TX ports and GPS ports cannot ensure power accuracy when power setting is lower than –130dBm, this power setting value is defined by the sum of RF Power setting and related amplitude correction value. But user settable value could be lower than this limit. When application detected there exists power setting lower than –130dBm on MPA RFIO TX ports, then popup warning message . When application detected there exists power setting lower than –130dBm on MPA GPS ports, then popup warning message . These are only warning messages, and check is performed when RF is ON.
Notes	The Min and Max value here defined UI settable amplitude range. This range is larger than actual amplitude range with level accuracy defined in spec.
Dependencies	The RF power is dependent on the RF output port and frequency, such that the current frequency and selected output port determine the valid range of power values.
Preset	–100 dBm
Min	The range of values depends on the current frequency and selected RF output port. Please refer to "RF Power" on page 772 and the table RF Power Range for the valid ranges.
Max	The range of values depends on the current frequency and selected RF output port. Please refer to "RF Power" on page 772 and the table RF Power Range for the valid ranges.
Initial S/W Revision	A.05.00

Waveform

Allows you access to the sub-menus for selecting the waveform to be played back during the current step. Pressing this key also changes the central display area to show the Waveform File Selection view.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:WAVeform <string>` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:WAVeform?`
Example	:SOUR:LIST:STEP2:SET:WAV “CW” :SOUR:LIST:STEP2:SET:WAV?
Notes	SCPI is supported after A.09.40
Remote Command Notes	String type, takes “Off” | “CW” | “Cont” | “waveform name”

Preset	CW
Range	Waveform | Continue Previous | CW | Off
Initial S/W Revision	A.05.00

CW

Sets the current step to output a CW tone.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform
Example	:SOUR:LIST:STEP2:SET:WAV “CW”
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Selected Waveform

Inserts the currently selected waveform in the waveform selection view as the waveform for playback during the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform
Example	:SOUR:LIST:STEP2:SET:WAV “waveform name”
Notes	SCPI is supported after A.09.40 If the selected waveform contains header (which contains ARB play parameters), source list sequence will automatically apply header settings of the selected waveform in that step.
Initial S/W Revision	A.05.00

Continue Previous

Sets the current step to continue with playback of the waveform from the previous step. When continuing the previous waveform, the ARB playback will not pause while the source retunes to the new frequency or amplitude that may be defined for the new step.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform
Example	:SOUR:LIST:STEP2:SET:WAV “Cont”
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Off

Disable RF outpu of the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform
Example	:SOUR:LIST:STEP2:SET:WAV “Off”
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Segments on Hard Disk

Allows you access to the sub-menus for loading waveform segments from the hard disk into ARB memory. The default directory is: D: varb.

Pressing this key changes the current view to the Waveform Management View.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Initial S/W Revision	A.05.00

Load Segment To ARB Memory

Allows you to load the selected file into ARB memory. On the front panel you select the file for loading to the ARB memory by highlighting the desired file in the list. Using the SCPI command, you specify the file name on the HDD.

“NVWFM” (none-volatile storage) MSUS (Mass Storage Unit Specifier) is supported in the memory subsystem because the ARB memory cannot be accessed directly. Therefore, files must be downloaded to the instrument hard disk and then loaded into the ARB memory. “NVWFM” MSUS will be mapped to the default directory D: VARB. The SCPI command supports using either “NVWFM” MSUS or specifying a full path. For more information, see Memory Subsystem (Remote Command Only).

If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MMEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:LOAD <string>`
Example	:SOUR:RAD:ARB:LOAD “D: VARB\testwaveform.bin” or :SOUR:RAD:ARB:LOAD “NVWFM:testwaveform.bin”
Notes	Because loading the file involves a delay of unpredictable length, this command should be followed by the query *OPC?, which holds off subsequent commands until the loading operating is complete. <string> – specifies the path name of the file to load from the HDD into ARB memory. It could be a <full path + filename>, or <“NVWFM” MSUS + colon + filename>.

	When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load a file to ARB memory will be rejected with an error. When Include Source is Noand if there is insufficient free ARB memory to load the selected waveform, an error is generated. . If you specify a file over SCPI, but the file is not at the specified location, an error is generated. If you try to load a waveform file but the file contains less than 500 IQ sampes, an error is generated. If you try to load a Signal Studio waveform "*.wfm" which contains invalid waveform header, an error is generated. If the ARB is ON when you load afile to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished. ARB can be loaded into ARB memory even required licenses do not present on the instrument. In this case, a GUI only warning message –800, "Operation complete; Loaded <filename> successfully, but no license <required licenses> installed". User can install required licenses according to <required licenses> string to license it, or multi-pack license it.
Initial S/W Revision	A.05.00

Load All To ARB Memory

Allows you to load all the segment files within the currently selected directory into ARB memory. If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:LOAD:ALL <string>`
Example	:SOUR:RAD:ARB:LOAD:ALL "D: varb"
Notes	<string> - specifies the directory on the HDD to load the files into ARB memory from. When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load all files from a directory to ARB memory is rejected with an error. When Include Source is No and there is insufficient free ARB memory to load all the waveforms, when the ARB memory is full, the copy ceases, and an error is generated. If you specify a directory over SCPI, but the directory does not exist, an error is generated. If the ARB is ON, a user then loads or deletes file to ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Change Directory...

Allows you to change the currently selected directory on the hard disk. Pressing this key opens a standard windows change directory dialog allowing you to select the new directory of interest.

The current directory is used for manually loading waveform segments into ARB memory for playback, and as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence or a list sequence.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Notes	No remote command, SCPIfront panel only.
Initial S/W Revision	A.05.00

Default Directory...

Allows you to change the default directory. It is used as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence, and as a search location for selecting waveforms using SCPI.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:DEFault:DIRectory <string>` `:SOURce:RADio:ARB: DEFault:DIRectory?`
Example	:SOUR:RAD:ARB:DEF:DIR “D:\ArbFiles” :SOUR:RAD:ARB:DEF:DIR?
State Saved	Persistent, survives a power cycle and a preset but not saved in the instrument state
Initial S/W Revision	A.05.00

Segments in ARB Memory

Allows you access to the sub-menus for managing the files within ARB memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Initial S/W Revision	A.05.00

Delete Segment From ARB Mem

Allows you to remove a segment from ARB playback memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments in ARB Memory
Remote Command	`:SOURce:RADio:ARB:DELete <string>`
Example	:SOUR:RAD:ARB:DEL “testwaveform.bin”
Notes	<string> - specifies the waveform to be deleted from the ARB playback memory. When in Sequence Analyzer mode and Include Source is Yes, an attempt to delete a file from ARB

	memory is rejected with an error. When Include Source is No and you specify a file that does not exist within ARB memory, an error is generated. It is possible to delete files from within the ARB memory when the ARB is ON. However, if you attempt to delete the file that is currently playing an error is generated. It is possible to delete a file from within the ARB memory when the sequencer state is ON and the file is not being used by the List Sequencer. If you attempt to delete a file which is being used by the list sequencer, an error is generated. When sequencer state is On, even if ARB state is On, the selected waveform will not be played. In this case, if the selected waveform is not used in List Sequence, it can be deleted and the ARB state is turned Off. If the ARB is ON and you load a file to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Delete All From ARB Memory

Allows you to remove all segments from ARB playback memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments in ARB Memory
Remote Command	`:SOURce:RADio:ARB:DELete:ALL`
Example	:SOUR:RAD:ARB:DELete:ALL
Notes	When in Sequence Analyzer mode and Include Source is Yes, an attempt to delete all files from ARB memory is rejected with an error. When Include Source is No and you attempt to delete all files from ARB memory when the ARB is currently playing a file, all files except the one playing are deleted and an error is generated. If you attempt to delete all files from ARB memory when there are waveform files used in "List Sequencer" on page 850 and "Sequencer" on page 851 state is ON, all files except the files currently being used in list sequencer are deleted, and an error is generated. If the ARB is ON and you load a file to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Segments on Hard Disk

This key functions the same as "Segments on Hard Disk" on page 877.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform
Initial S/W Revision	Prior to A.09.00

Load Segment To ARB Memory

This key functions the same as "Load Segment To ARB Memory" on page 877.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Load All To ARB Memory

This key functions the same as "Load All To ARB Memory" on page 878.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Change Directory ...

This key functions the same as "Change Directory..." on page 879.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Default Directory ...

This key functions the same as "Default Directory..." on page 879

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Segments in ARB Memory

This key functions the same as "Segments in ARB Memory" on page 879.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform, Segments in ARB Memory
Initial S/W Revision	Prior to A.09.00

Delete Segment From ARB Memory

This key functions the same as "Delete Segment From ARB Mem" on page 879.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform, Segments in ARB Memory, Segment in ARB Memory
Initial S/W Revision	Prior to A.09.00

Delete All From ARB Memory

This key functions the same as "Delete All From ARB Memory" on page 880.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform, Segments in ARB Memory, Segment in ARB Memory
Initial S/W Revision	Prior to A.09.00

Step Duration

Allows access to the sub-menus for setting up the duration of play for the current step.

The duration can be set to be either the number of times for the ARB file associated with the sequence to play, or a specific time value, or continuous. If the step is set to play a CW tone, the step duration cannot be set to a play count.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:DURation:TYPE TIME | COUNt | CONTinuous | CABort` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:DURation:TYPE?`
Example	:SOUR:LIST:STEP2:SET:DUR:TYPE TIME :SOUR:LIST:STEP2:SET:DUR:TYPE?
Notes	SCPI is supported after A.09.40
Notes	If “Step Duration” is set to “Time” or “Play Count” for the last step, the last step of ARB keeps playing as if set to “Continuous”, until the set “Time” has expired or until the “Play Count” setting is reached. However, you can query Error! Reference source not found. Source Sweeping Condition Message to find out if the current list sequence is complete or not.
Range	Time | Play Count | Continuous | Continuous Abort
Initial S/W Revision	A.05.00

Time

Sets the duration of the current step to be a time value for the length of time the step will play. Pressing this key again opens another menu which allows you to set the time value for the step duration.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Duration
Example	:SOUR:LIST:STEP2:SET:DUR:TYPE TIME
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Duration Time

Allows you to specify the length of time the current step will play.

When Step Duration is Continuous Abort this parameter specifies the maximum duration that the waveform will continue to play after a step trigger is received before the transition to the next waveform will occur. Duration is limited to a maximum of 20 seconds.

If the Transition Time value is longer than the Step Duration Time, an error is generated when initiating a source list sequence. For source list sequence, transition time is included in the step duration length (not occupy additional time). If the Transition Time value is longer than the Step Duration Time, the real step duration length is extended to equal the transition time and cause a timing shift. This check is also described in section Error! Reference source not found. List Sequence Step Validation.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Duration, Time
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:DURation:TCOunt <double>` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:DURation:TCOunt?`
Example	:SOUR:LIST:STEP2:SET:DUR:TCO 1s :SOUR:LIST:STEP2:SET:DUR:TCO?
Notes	SCPI is supported after A.09.40 This SCPI is reused by “Play Count” ,“Duration Time” and “Continuous Abort” according to current Duration Type setting is “Play Count” or “Duraton Time” or “Continuous Abort”. If current “Duration Type” is “Continuous”, then popup error –221,"Settings conflict;Cannot accept time or count input when step duration type is Continuous on step #"
Notes	If “Duration Time” is set for the last step, the last step of ARB keeps playing as if set to “Continuous” after set time expires. However, you can query Source Sweeping Condition Message (:STAT:OPER:COND?) to find out if the current list sequence is complete or not.
Preset	1.00 ms
Min	100 µs
Max	1800 s
Initial S/W Revision	A.05.00

Play Count

Sets the duration of the current step to be an integer value for the number of times (play count) the ARB file is selected for playback during this step. For example, a 5 second ARB will be set to play 5 times during the step.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Duration
Example	:SOUR:LIST:STEP2:SET:DUR:TYPE COUN
Notes	SCPI is supported after A.09.40 This key is unavailable and is grayed out if the current step is configured to CW tone rather than an ARB waveform.
Initial S/W Revision	A.05.00

Header Utilities

Allows access to the header utilities sub-menu. Pressing this key also causes the central display area to change to display the File Header Information view.

Key Path	Source, Modulation Setup, ARB
Dependencies	This key is only available if there is currently a waveform selected for playback. If no waveform is selected, the key is grayed out.
Initial S/W Revision	A.05.00

Continuous

Sets the current step to be played continuously until the next step starts. The waveform will always play completely before transitioning to the next step.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Duration
Example	:SOUR:LIST:STEP2:SET:DUR:TYPE CONT
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Output Trigger

Allows you to specify the trigger output for the current step. The trigger output signal is sent at the start of the step.

When select “On”, trigger event will occur on both Internal and External2 paths. Select “Off” will turn off trigger output.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:OUTPut:TRIGger ON | OFF | 1 | 0` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:OUTPut:TRIGger`
Example	:SOUR:LIST:STEP2:SET:OUTP:TRIG ON :SOUR:LIST:STEP2:SET:OUTP:TRIG?
Notes	SCPI is supported after A.09.40
Preset	Off
Range	On|Off
Initial S/W Revision	A.05.00

Step Configuration (Remote Command Only)

This SCPI command is used to configure the List Sequencer and is detailed in the table below. The command is defined such that you send one command per step, with the step number being specified as a subopcode of the SCPI command. Each command includes all the parameter settings for the step. As a step is setup, the values entered are run through several levels of validation.

Remote Command	`:SOURce:LIST:STEP[1]|2|...|4..1000:SETup IMMediate | INTernal | KEY |`

	BUS | EXTernal2, <time>, NONE | PGSM | EGSM | RGSM | DCS1800 | PCS1900 | TGSM810 | GSM450 | GSM480 | GSM700 | GSM850 | BANDI | BANDII | BANDIII | BANDIV | BANDV | BANDVI | BANDVII | BANDVIII | BANDIX | BANDX | BANDXI | BANDXII | BANDXIII | BANDXIV | BANDXIX | USCELL | USPCS | JAPAN | KOREAN | NMT | IMT2K | UPPER | SECOND | PAMR400 | PAMR800 | IMTEXT | PCS1DOT9G | AWS | US2DOT5G | PUBLIC | LOWER | NONE | BAND1 | BAND2 | BAND3 | BAND4 | BAND5 | BAND6 | BAND7 | BAND8 | BAND10 | BAND11 | BAND12 | BAND13 | BAND14 | BAND17 | BAND18 | BAND19 | BAND20 | BAND21 | BAND24 | BAND25 | BAND26 | BAND33 | BAND34 | BAND35 | BAND36 | BAND37 | BAND38 | BAND39 | BAND40 | BAND41 | BAND42 | BAND43 | BANDA | BANDB | BANDC | BANDD | BANDE | BANDF, DOWN | UP, <freq>, <ampl>, <string>, TIME | COUNt | CONTinuous, <time>, ON | OFF | 1 | 0, [<int>], :SOURce:LIST:STEP[1]|2|...|4..1000:SETup?
Example	:SOUR:LIST:STEP1:SET INT, 1ms, PGSM, DOWN, 10, –25 dBm, “GSM_Test1.bin”, TIME, 10ms, OFF, 255
Notes	The parameters are: (There is a total of 11 items in each step, the following is a list of the items in the order they must appear in the remote command.) 1. Step Trigger <**enum**> – specifies the input trigger for the step. For details of the valid types of step trigger see "Step Trigger" on page 853. 2. Transition Time <**time**> – specifies the transition time for the stepin seconds. For details of the valid ranges for the transition time see "Transition Time" on page 855. 3. Radio Band <**enum**> – specifies the radio band for the step. For details of the valid radio bands see "Radio Setup" on page 856. 4. Radio Band Link <**enum**> – specifies the radio band link direction for the step. For details of the valid link types, see "Radio Band Link" on page 873. 5. Frequency/Channel Number <**freq**>/<chan num> – specifies the frequency in Hz or the channel number for the step. The channel number and frequency are combined as one parameter that represents the frequency or channel number depending on the radio band setting. If the radio band is set to NONE, this value is interpreted as a frequency value in Hz. If the radio band is set to a valid band, this value is interpreted as a channel number. For details of the valid ranges for frequency and channel numbers, see "Channel" on page 873 and "Frequency" on page 874 . 6. Power <**ampl**> – specifies the output power for the step in dBm. For details of the valid ranges see "Power" on page 874. 7. Waveform <**string**> – specifies the waveform for playback during the step. The step can output either a new ARB waveform, continue playback of the previous waveform, or output a CW tone. The options for specifying these are: <filename> - plays the specified waveform from the start. The filename value is the name of the file within ARB playback memory, it is does not include the windows path to the file on the HDD. If you enter a filename for a waveform that does not reside within ARB playback memory, an error is generated. CONT – continues playback of the ARB file from the previous step CW – outputs a CW tone OFF – disable RF output 8. Step Duration <**enum**> – specifies the duration of the step. The duration can be specified to be either time, or play count of the ARB file associated with the step, or continuous. If Waveform is set to “CW”, this value cannot be set to Play Count and an error will be generated. If continuous is selected, the following Time or Count value is ignored. For further details of this setting, see "Step

	Duration" on page 882. 9. Time or Count <time/int> – specifies time duration in seconds or play count of the ARB file associated with the step. For further details of this setting, including the valid ranges for the time or play count setting, "Time" on page 882 and "Play Count" on page 883. 10. Output Trigger <Boolean> – specifies the output trigger for the step. For details of the ranges for this setting see "Output Trigger" on page 884.
Dependencies	The range of subopcode values is 1 to 1000 and the value you enter is determined by the number of steps you have configured. For details see "Number of Steps" on page 852. If you attempt to remotely set or query a subopcode that is out of range, an error is generated.
Initial S/W Revision	A.05.00

Step Configuration of Step Trigger parameter list (Remote Command Only)

This SCPI command is to configure “Step Trigger” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:INPut:TRIGger <enum>, <enum>, <enum>, …` `:SOURce:LIST:SETup:INPut:TRIGger?`
Example	:SOUR:LIST:SET:INP:TRIG IMM,INT,EXT2 :SOUR:LIST:SET:INP:TRIG?
Notes	The command is to setup below parameter array of whole list sequence. Step Trigger <**enum**> – specifies the input trigger for the step. For details of the valid types of step trigger see "Step Trigger" on page 853. If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in number of steps will be updated.
Remote Command Notes	IMMediate|INTernal|KEY|BUS|EXTernal2
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Transition Time parameter list (Remote Command Only)

This SCPI command is to configure “Transition Time” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:TRANsition:TIME <time>, <time>, <time>, …` `:SOURce:LIST:SETup:TRANsition:TIME?`
Example	:SOUR:LIST:SET:TRAN:TIME 1ms,1ms,1ms

	:SOUR:LIST:SET:TRAN:TIME?
Notes	The command is to setup below parameter array of whole list sequence. Transition Time <**time**> – specifies the transition time for the stepin seconds. For details of the valid ranges for the transition time see "Transition Time" on page 855 If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in number of steps will be updated.
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Radio Band parameter list (Remote Command Only)

This SCPI command is to configure “Radio Band” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:RADio:BAND <enum>, <enum>, <enum>, …` `:SOURce:LIST:SETup:RADio:BAND?`
Example	:SOUR:LIST:SET:RAD:BAND PGSM, EGSM, RGSM :SOUR:LIST:SET:RAD:BAND?
Notes	The command is to setup below parameter array of whole list sequence. Radio Band <**enum**> – specifies the radio band for the step. For details of the valid radio bands see "Radio Setup" on page 856. If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in number of steps will be updated.
Rem	NONE|PGSM|EGSM|RGSM|DCS1800|PCS1900|TGSM810|GSM450|GSM480|GSM700|GSM850|BANDI|BANDII|BANDIII|BANDIV|BANDV|BANDVI|BANDVII|BANDVIII|BANDIX|BANDX|BANDXI|BANDXII|BANDXIII|BANDXIV|BANDXIX|USCELL|USPCS|JAPAN|KOREAN|NMT|IMT2K|UPPER|SECOND|PAMR400|PAMR800|IMTEXT|PCS1DOT9G|AWS|US2DOT5G|PUBLIC|LOWER|NONE|BAND1|BAND2|BAND3|BAND4|BAND5|BAND6|BAND7|BAND8|BAND10|BAND11|BAND12|BAND13|BAND14|BAND17|BAND18|BAND1

Note	9|BAND20|BAND21|BAND24|BAND25|BAND26|BAND33|BAND34|BAND35|BAND36|BAND37|BAND38|BAND39|BAND40|BAND41|BAND42|BAND43|BANDA|BANDB|BANDC|BANDD|BANDE|BANDF
Command Notes	
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Radio Band Link parameter list (Remote Command Only)

This SCPI command is to configure “Radio Band Link” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:RADio:BAND:LINK <enum>, <enum>, <enum>, …` `:SOURce:LIST:SETup:RADio:BAND:LINK?`
Example	:SOUR:LIST:SET:RAD:BAND:LINK DOWN,UP,UP :SOUR:LIST:SET:RAD:BAND:LINK?
Notes	The command is to setup below parameter array of whole list sequence. Radio Band Link <**enum**> – specifies the radio band link direction for the step. For details of the valid link types, see "Radio Band Link" on page 873. If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in number of steps will be updated.
Remote Command Notes	DOWN|UP
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Frequency/Channel Number parameter list (Remote Command Only)

This SCPI command is to configure “Frequency” or “Channel Number” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:CNFRequency <double>, <double>, <double>, …` `:SOURce:LIST:SETup:CNFRequency?`
Example	:SOUR:LIST:SET:CNFR 1GHz,100MHz,100MHz :SOUR:LIST:SET:CNFR? SOUR:LIST:SET:CNFR 124,124,124 :SOUR:LIST:SET:CNFR?
Notes	The command is to setup below parameter array of whole list sequence. Frequency/Channel Number <**freq**>/<chan num> – specifies the frequency in Hz or the channel number for the step. The channel number and frequency are combined as one parameter that represents the frequency or channel number depending on the radio band setting. If the radio band is set to NONE, this value is interpreted as a frequency value in Hz. If the radio band is set to a valid band, this value is interpreted as a channel number. For details of the valid ranges for frequency and channel numbers, see "Channel" on page 873 and "Frequency" on page 874 This SCPI is used to setup/query channel number or frequency setting, according to current Radio Band setting of that step. If Radio Band is “NONE”, then it’s frequency. If Radio Band is not “NONE”, then it’s channel number If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in

	legal step number will be updated.
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Power parameter list (Remote Command Only)

This SCPI command is to configure “Power”parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:AMPLitude <ampl>, <ampl>, <ampl>, …` `:SOURce:LIST:SETup:AMPLitude?`
Example	:SOUR:LIST:SET:AMPL –50dBm,–40dBm,–30dBm :SOUR:LIST:SET:AMPL?
Notes	The command is to setup below parameter array of whole list sequence. Power <**ampl**> – specifies the output power for the step in dBm. For details of the valid ranges see "Power" on page 874. If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in legal step number will be updated.
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Waveform parameter list (Remote Command Only)

This SCPI command is to configure “Waveform” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:WAVeform <string>, <string>, <string>, …` `:SOURce:LIST:SETup:WAVeform?`
Example	:SOUR:LIST:SET:WAV “CW”,”Off”,”CONT” :SOUR:LIST:SET:WAV?
Notes	The command is to setup below parameter array of whole list sequence. Waveform <**string**> – specifies the waveform for playback during the step. The step can output either a new ARB waveform, continue playback of the previous waveform, or output a CW tone. The options for specifying these are: <filename> - plays the specified waveform from the start. The filename value is the name of the file within ARB playback memory, it is does not include the windows path to the file on the HDD. If you enter a filename for a waveform that does not reside within ARB playback memory, an error is generated.

	CONT – continues playback of the ARB file from the previous step CW – outputs a CW tone OFF – disable RF output If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in number of steps will be updated.
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Range	”filename” | “CW” | “Off” | “CONT”
Initial S/W Revision	A.09.40

Step Configuration of Step Duration parameter list (Remote Command Only)

This SCPI command is to configure “Step Duration” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:DURation:TYPE <enum>, <enum>, <enum>, …` `:SOURce:LIST:SETup:DURation:TYPE?`
Example	:SOUR:LIST:SET:DUR:TYPE COUN,TIME,CONT :SOUR:LIST:SET:DUR:TYPE?
Notes	The command is to setup below parameter array of whole list sequence. Step Duration <**enum**> – specifies the duration of the step. The duration can be specified to be either time, or play count of the ARB file associated with the step, or continuous. If Waveform is set to “CW”, this value cannot be set to Play Count and an error will be generated. If continuous is selected, the following Time or Count value is ignored. For further details of this setting, see "Step Duration" on page 882. If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in number of steps will be updated.
Remote Command Notes	TIME | COUNt | CONTinuous
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Duration Time or Play Count parameter list (Remote Command Only)

This SCPI command is to configure “Duration Time” or “Play Count” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:TOCount <time/int>, <time/int>, <time/int>, …` `:SOURce:LIST:SETup:TOCount?`

Example	:SOUR:LIST:SET:TOC 1s,2s,3s :SOUR:LIST:SET:TOC? :SOUR:LIST:SET:TOC 5,6,7 :SOUR:LIST:SET:TOC?
Notes	The command is to setup below parameter array of whole list sequence. Time or Count <time/int> – specifies time duration in seconds or play count of the ARB file associated with the step. For further details of this setting, including the valid ranges for the time or play count setting, "Time" on page 882 and "Play Count" on page 883. If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in number of steps will be updated. If current "Step Duration" on page 882 is “Continuous”, then generate error –221,"Settings conflict;Cannot accept time or count input when step duration type is Continuous on step #"
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Output Trigger parameter list (Remote Command Only)

This SCPI command is to configure “Output Trigger”parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:OUTPut:TRIGger <bool>, <bool>, <bool>, …` `:SOURce:LIST:SETup:OUTPut:TRIGger ?`
Example	:SOUR:LIST:SET:OUTP:TRIG ON,OFF,ON :SOUR:LIST:SET:OUTP:TRIG?
Notes	The command is to setup below parameter array of whole list sequence. Output Trigger <Boolean> – specifies the output trigger for the step. For details of the ranges for this setting see "Output Trigger" on page 884. If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in legal step number will be updated.
Remote Command Notes	ON|OFF|1|0
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Clear List (Remote Command Only)

This command is the SCPI equivalent of the Clear List UI featuredescribed in.

Remote Command	`:SOURce:LIST:SETup:CLEar`
Example	:SOUR:LIST:SETup:CLE
Initial S/W Revision	A.05.00

Trigger Type

Allows access to the sub-menu for selecting the output trigger type for the list sequencer globally. It cannot be changed between different sequence steps.

Key Path	Source, List Sequencer
Remote Command	`:SOURce:LIST:TRIGgerout:TYPe BEGinningofstep|DATamarker`
Example	:SOUR:LIST:TRIG:TYP BEG :SOUR:LIST:TRIG:TYP?
Notes	SCPI is supported after A.14.00
Preset	BEGinningofstep
Range	BEGinningofstep|DATamarker
Initial S/W Revision	A.14.00

BeginningOfStep

Sets the output trigger type as BeginningOfStep for the whole source sequence.

Key Path	Source, List Sequencer, Trigger Type
Example	:SOUR:LIST:TRIG:TYP BEG
Notes	SCPI is supported after A.14.00
Initial S/W Revision	A.14.00

DataMarker

Sets the output trigger type as DataMarker for the whole source sequence. When DataMarker is selected, which marker to route is also needed to be set.

Key Path	Source, List Sequencer, Trigger Type
Example	:SOUR:LIST:TRIG:TYP DAT
Notes	SCPI is supported after A.14.00
Initial S/W Revision	A.14.00

Marker 1

Sets the output trigger maker routing to Marker 1 for DataMarker in the whole source sequence.

Key Path	Source, List Sequencer, Trigger Type, DataMarker
Example	:SOUR:LIST:TRIG:TYPE:MARK M1
Notes	SCPI is supported after A.14.00
Initial S/W Revision	A.14.00

Marker 2

Sets the output trigger maker routing to Marker 2 for DataMarker in the whole source sequence.

Key Path	Source, List Sequencer, Trigger Type, DataMarker
Example	:SOUR:LIST:TRIG:TYPE:MARK M2
Notes	SCPI is supported after A.14.00
Initial S/W Revision	A.14.00

Marker 3

Sets the output trigger maker routing to Marker 3 for DataMarker in the whole source sequence.

Key Path	Source, List Sequencer, Trigger Type, DataMarker
Example	:SOUR:LIST:TRIG:TYPE:MARK M3
Notes	SCPI is supported after A.14.00
Initial S/W Revision	A.14.00

Marker 4

Sets the output trigger maker routing to Marker 4 for DataMarker in the whole source sequence.

Key Path	Source, List Sequencer, Trigger Type, DataMarker
Example	:SOUR:LIST:TRIG:TYPE:MARK M4
Notes	SCPI is supported after A.14.00
Initial S/W Revision	A.14.00

Manual Trigger Now

Pressing this key provides a software trigger event to the list sequencer. During execution of sequence, if the sequencer is halted on any step that has been configured with a “Manual” step trigger, then this key press will cause the sequencer to continue and execute the step.

Key Path	Source, List Sequencer
Remote Command	No remote command, front panel only.
Initial S/W Revision	A.05.00

Remote Software Trigger (Remote command Only)

During execution of a list sequence, the sequence will halt and wait at any step that has Step Trigger set to "Bus". Sending this command will trigger the step and continue the sequence.

Remote Command	`:SOURce:LIST:TRIGger:INITiate[:IMMediate]`
Example	:SOUR:LIST:TRIG:INIT
Initial S/W Revision	A.05.00

Query List Sequence Initiation Armed Status (Remote Command Only)

This is a blocking SCPI query to determine if source list sequence being initiated successfully or not.

Remote Command	`:SOURce:LIST:INITiation:ARMed?`
Example	:SOUR:LIST:INIT:ARMed?
Notes	The return data is in the following format: Integer
Notes	Query only SCPI. Returning "1" if list sequence has been initiated successfully, returning "0" if not. Once get "0", you can use :SYST:ERR? to query what error happened. Just like "*OPC?", this command can be blocked until event/status "IsSourceSweeping" happens, and then returns. Doing so can help user's script query armed status only once during the time interval of the initiation. As an ancillary SCPI of existing SCPI ":SOUR:LIST:TRIGger[:IMMediate]" (see "Initiate Sequence" on page 851 Initiate Sequence), the right usage of this command is to use it after ":SOUR:LIST:TRIG". If not, this command will return "1" immediately.
Notes	There is an alias SCPI ":SOURce:LIST:TRIGger:INITiation:ARMed?".
Initial S/W Revision	A.09.40

Source Preset

Allows you to preset the source settings to their default values.

Key Path	Source
Remote Command	`:SOURce:PRESet`
Example	:SOUR:PRES

Signal Track

Attempts to keep the largest magnitude signal in the center of the screen for a spectrum display. It is the equivalent of manually doing a single acquisition, doing a marker to peak search on a spectrum trace, then copying the marker position to the center frequency and repeating. (It is not necessary to be viewing a spectrum display for this function to work.)

Key Path	SPAN X Scale
Mode	VSA
Remote Command	`[:SENSe]:VECTor|ADEMod:FREQuency:CENTer:TRACk OFF|ON|0|1` `[:SENSe]:VECTor|ADEMod:FREQuency:CENTer:TRACk?`
Example	VECT:FREQ:CENT:TRAC ON VECT:FREQ:CENT:TRAC?
Couplings	Unavailable if averaging is turned on.
Preset	0
State Saved	Saved in instrument state.
Range	On | Off
Initial S/W Revision	Prior to A.02.00

Sweep/Control

Displays a menu that enables you to control time-related measurement parameters and to pause or resume the measurement.

Key Path	Front Panel
Mode	VSA
Initial S/W Revision	A.01.60 or later

Main Time

Enables you to control the length of the overall time record used in the measurement. Note that the Gate function (see "Gate" on page 656) enables you to analyze only a portion of the displayed Main Time. Time length and Res BW are related by the following equation:

Res BW = ENBW / T

where ENBW is the normalized effective noise bandwidth of the Window (see the FFT Window topic under BW for more details) and T is the time record length (in seconds).

Therefore, if you change Main Time, the Resolution bandwidth must also change, and vice versa.

Time record size (in sample points) can vary between 16 points and the full FFT size used for spectrum calculations. The FFT size is indirectly chosen by setting Freq Points (see "Freq Points" on page 658) and is equal to (Freq Points – 1)* 1.28.

Main Time length (in seconds) is the time record size times the sample period. The sample period for the Main Time result is 1/(1.28*Span).

Limits:

The maximum Main Time length is:

Max FFT size / (1.28 * Span) = (409600)/Span if Freq points state parameter is set to Auto

FFT size / (1.28 * Span) = (Freq Points – 1)/Span if Freq points parameter is manually set

Note that the minimum Res BW is related to maximum Main Time length.

The minimum Main Time length is

16 points / (1.28 * Span) = 12.5/Span

See "Res BW" on page 459 and "Res BW Coupling" on page 460 for details on couplings that can change Main Time length due to Res BW changes.

Key Path	Sweep Control
Mode	VSA
Measurement	<meas>:=VECTor|ADEMod
Remote Command	`[:SENSe]:<meas>:SWEep:TIME <time>`
	`[:SENSe]:<meas>:SWEep:TIME?`

Example	VECT:SWE:TIME 3 MS VECT:SWE:TIME?
Notes	This key is not available in measurements other than Vector or Analog Demod. The annotation is shown, however. In other measurements the time length is determined by number of symbols.
Couplings	Affected by Res BW, Span, Freq Points, and Window. See "Res BW" on page 459 and "Res BW Coupling" on page 460 for details.
Preset	12.75e-6
State Saved	Saved in instrument state.
Min	-9.9e37
Max	9.9e37
Initial S/W Revision	A.01060 or later

Pause / Resume

Pauses or resumes acquisition at the end of the current time record acquisition.

Key Path	Sweep Control
Mode	VSA
Initial S/W Revision	A.01060 or later

Gate

Accesses a menu of time gating control functions. Time gating lets you isolate a portion of a Main Time record to be used for downstream spectrum and statistical analysis (instead of the whole time record). The gate position can be changed during a stopped measurement and the instantaneous gate time and spectrum traces update immediately. Averages are restarted when gate properties change. The windowing function used in gated measurements is the same as non-gated measurements.

Key Path	Sweep Control
Mode	VSA
Initial S/W Revision	A.01060 or later

Gate

Turns time gating on or off.

Key Path	Sweep/Control
Mode	VSA
Measurement	<meas>:=VECTor|ADEMod
Remote Command	`[:SENSe]:<meas>:SWEep:EGATe:STATe OFF|ON|0|1`

	[:SENSe]:<meas>:SWEep:EGATe:STATe?
Example	VECT:SWE:EGAT:STAT ON VECT:SWE:EGAT:STAT?
Preset	0
State Saved	Saved in instrument state.
Initial S/W Revision	A.01060 or later

Gate Length

Adjusts the time between the beginning and the end of the gate.

Key Path	Sweep/Control
Mode	VSA
Measurement	<meas>:=VECTor|ADEMod
Remote Command	[:SENSe]:<meas>:SWEep:EGATe[:SPAN] <time> [:SENSe]:<meas>:SWEep:EGATe[:SPAN]?
Example	VECT:SWE:EGAT 2 MS VECT:SWE:EGAT?
Couplings	Gate length and delay are limited so that the gate always falls within the current time record. If the time record length decreases, the gate delay is limited first, then the gate length.
Preset	1.28125e-6
State Saved	Saved in instrument state.
Min	16 time samples
Max	Time record length
Initial S/W Revision	A.01060 or later

Gate Delay

Adjusts the time between the start of the time record and the beginning of the gate.

Key Path	Sweep/Control
Mode	VSA
Measurement	<meas>:=VECTor|ADEMod
Remote Command	[:SENSe]:<meas>:SWEep:EGATe:DELay <time> [:SENSe]:<meas>:SWEep:EGATe:DELay?
Example	VECT:SWE:EGAT:DEL 500 US VECT:SWE:EGAT:DEL?
Couplings	Gate length and delay are limited so that the gate always falls within the current time record. If the time record length decreases, the gate delay is limited first, then the gate length.

Preset	0
State Saved	Saved in instrument state.
Min	0
Max	Time record length – gate length
Initial S/W Revision	A.01060 or later

Freq Points

Enables you to manually enter the number of displayed frequency points. By default, the analyzer chooses the number of Freq Points displayed in Spectrum or PSD displays, depending on the Res BW or Main Time length chosen. Auto mode is recommended. The number of Freq Points is related to the number of FFT points used in spectrum calculations (which is always a power of 2).

Freq Points = (FFT points)/1.28 + 1

Note that if All Frequency Points is turned on for a selected trace, then all computed FFT points are shown. (See All Frequency Points.)

Key Path	Sweep Control
Mode	VSA
Measurement	<meas>:=VECTor|ADEMod
Remote Command	`[:SENSe]:<meas>:SWEep:POINts <integer>`
	`[:SENSe]:<meas>:SWEep:POINts?`
	`[:SENSe]:<meas>:SWEep:POINts:AUTO OFF|ON|0|1`
	`[:SENSe]:<meas>:SWEep:POINts:AUTO?`
Example	VECT:SWE:POIN 801
	VECT:SWE:POIN?
	VECT:SWE:POIN:AUTO ON
	VECT:SWE:POIN:AUTO?
Notes	Keyboard entry or setting this by SCPI forces state to manual. Any entry other than a valid value is rounded up to the next available value (or limited to the maximum).
	This key is not shown in measurements other than Vector or Analog Demod.
Couplings	See Res BW Coupling section
Preset	801
	1
State Saved	Saved in instrument state.
Range	51|101|201|401|801|1601|3201|6401|12801|25601|51201|102401|204801|409601
Initial S/W Revision	A.01060 or later

System

See "System" on page 182

Channel 1

Accesses time domain and frequency domain measurement results and enables you to assign them to traces.

Key Path	Trace/Detector, Data,
Mode	VSA

Main Time

Displays the Main Time data result in the selected trace.

Main Time versus Gate Time

The term is used to differentiate between the "main" time record and the "gate" time record when time gating is on.

A time record is the basic building block of the Fast Fourier Transform (FFT). The FFT takes the time-domain information in the time record and transforms it into the frequency domain.

When time gating is on, you can identify a portion of the main time-record to be used by the FFT. The term "main time-record" identifies the entire time record; the term "gate time-record" identifies the portion selected by the gate.

The following block diagram shows the blocks that create main time and gate time.

Note that the Analog Demodulation block is available only when analog demodulation is enabled.

There are many reasons why you may want to view the main time record. Here are just a few:

- To verify that there is an input signal.
- To see the characteristics of the input signal.
- To help in manually setting the input range.

Time Records and Span

If you set the analyzer to full span, the time data you see is the actual input time-record. This is raw input data – the signal from which all subsequent measurements are based.

If you set the instrument to measure a specific bandwidth (something less than full span), the time data you see is the raw input data after it has been filtered (to provide alias protection) and decimated (to obtain the desired span).

Time Records and Averaging

If rms or continuous peak-hold averaging is on, the analyzer displays the most recent time record. The analyzer does not show an averaged time waveform, because all averaging is done after the time data has

been transformed to the frequency domain.

If time averaging is on, the analyzer displays the averaged time-record. In other words, the time record has been averaged with previous time records.

How the Analyzer Displays the Time Record

It is important to remember that although the time record looks like an oscilloscope display, the analyzer is not a digital oscilloscope.

The time record represents samples of a waveform. The samples have enough information to accurately reconstruct the input signal – but the human eye may not properly perform the reconstruction. In fact, for frequencies that are higher than about ten percent of the frequency span, there is noticeable visible distortion.

The analyzer's anti-alias filters cause some ringing or distortion of square waves or transients when viewed in the time domain.

See also: Data

Key Path	Trace/Detector, Data
Mode	VSA
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Auto Correlation

Displays the autocorrelation data result in the selected trace. Auto Correlation trace data displays the autocorrelation for the selected input channel. Autocorrelation is a form of correlation, a measure of the similarity between two signals.

Note that Auto Correlation is not available when digital demodulation is selected.

Tips

- Use ac coupling only. Correlation measurements are disturbed by dc offsets in the signal.
- Some types of averaging can be useful – rms averaging does not affect correlation measurements, but you can use time averaging to reduce noise, if you can provide a consistent trigger. However, averaging is usually unnecessary to make good correlation measurements.
- Use appropriate triggering and trigger delays. This is especially true for time averaging.
- Use a random noise source for delay measurements. Correlation measurements provide the ability to resolve time differences between waveforms that appear to be random.
- Waveforms on the correlation trace may not appear as they do in the time trace. This is particularly noticeable when you are using correlation to extract synchronous signals from noise. The different shape of some waveforms is a direct result of the mathematical definition of correlation. For example, a correlated square wave appears as a triangle wave. It's important to remember that the period of the waveform is preserved even if the correlation waveform looks different.

- To avoid wrap-around effects, correlation produces a time record one-half the length of the measurement time-record.

Theory of Operation

Autocorrelation is a form of correlation, a measure of the similarity between two signals. Correlation is performed by multiplying two signals together at each instant in time and summing all the products. If the signals are identical, every product is positive and the resulting sum is large.

If, however, the two signals are dissimilar, then some of the products are positive and some are negative. In this case, the final sum is smaller because the products tend to cancel.

Autocorrelation performs a time-shifted, "averaged" correlation on a single signal. The signal is correlated with time-shifted versions of itself. Furthermore, the products from each time-shift are averaged by dividing each final sum by the number of products contributing to it.

where: Rxx = autocorrelation function

τ = amount of time shift

∞ = infinity

$x(\tau)$ = signal to be correlated

intgrl = integration

conj = conjugation

T = time

$\times$ = multiplication

That is, the autocorrelation function is found by taking a signal, multiplying it by the same signal displaced (tau) units in time, and averaging the product over all time.

Duality With the Power Spectrum

For simplicity and speed, this analyzer performs the autocorrelation operation by taking advantage of its duality with the power spectrum:

Thus,

When to use Auto Correlation

Auto correlation is useful for detecting echoes in a signal. For random noise, an echo appears as an impulse – if there is more than one echo, you can see multiple peaks on the auto correlation trace. Keep in mind that an echo appears as an impulse only if the delayed signal has not been filtered. The impulse broadens as the original random noise signal is filtered – in fact, the width of each peak is inversely proportional to the bandwidth of the signal.

To determine the time delay (in seconds) of an echo, you can move the marker to the peak of the echo. Note that there is always a correlated peak at zero lag – this peak marks the original excitation signal. Any other peaks let you know that the excitation signal also appeared at another time relative to the original signal. The amplitude value at the zero lag point is the total power in the time record.

This function is also useful for isolating low-level periodic signals from noise. A sine wave signal shows up as a sine wave in auto correlation. A square wave signal shows up as a triangular wave of the same frequency.

Auto correlation is a single-channel measurement. If you have the original signal on one channel and the delayed version on another, use cross correlation.

Auto Correlation and Averaging

The following formulas show how the analyzer calculates auto correlation for different averaging functions:

Key: F = Fast Fourier Transform (FFT)

AC = Averaged correlation

AT = Averaged time

t = Instantaneous time

c = Instantaneous correlation

r = 1/2 width rectangular window

× = multiplication

n = Average number

No Average $c = I (conj (F(r \times t)) \times F [t])$

rms Average $c = I (conj (F(r \times t)) \times F [t])$

rms Expon. $c = I (conj (F(r \times t)) \times F [t])$

Average

Continuous

Peak Hold $c = I (conj (F(r \times t)) \times F [t])$

Average

Time $AC [n] = I (conj (F(r \times AT [n])) \times F (AT [n]))$

Average

Time

Expon. $AC[n] = I (conj (F(r \times AT [n])) \times F (AT [n]))$

Average

and: $1 < n <$ number of averages

See also: Data

Key Path	Trace/Detector, Data

Mode	VSA
Initial S/W Revision	Prior to A.02.00

Statistical

Accesses the Trace Data choices that show the statistical results: CCDF, CDF and PDF.

Key Path	Trace/Detector, Data
Mode	VSA

Data 5

Selects register 5 for assignment of trace data.

Key Path	Trace/Detector, Data, Register
Mode	VSA
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Data 6

Selects register 6 for assignment of trace data.

Key Path	Trace/Detector, Data, Register
Mode	VSA
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Limit Test (SCPI Only)

Enables you to enable or disable the Limit Test function for each Trace when the Trace supports the Limit Test function.

When enabled, if the limit test fails on the trace, “FAIL” is shown on the Meas Bar. Otherwise, “PASS” is shown.

Available only for the EVM measurement.

Mode	VSA, LTE, LTETDD
Measurement	<meas>:=EVM
Remote Command	`:CALCulate:<meas>:TRACe[1]|2|...|4:LIMit:VISible OFF|ON|0|1`

	:CALCulate:<meas>:TRACe[1]|2|...|4:LIMit:VISible?
Example	CALC:EVM:TRAC1:LIM:VIS ON CALC:EVM:TRAC1:LIM:VIS?
Notes	On the LTE/LTETDD EVM measurement, the following trace data is supported: In-band Emissions Eq Ch Freq Resp Per Slot Limit data can be queried by :CALC:EVM:DATA[1]|2|3|4? LL|UL command.
Preset	0
State Saved	Saved in instrument state.
Initial S/W Revision	A.08.00

Trigger

See ___ on page X

Free Run

See ___ on page X

Video

See ___ on page X

Trigger Level

See ___ on page X

Trig Slope

See ___ on page X

Trig Delay

See ___ on page X

Trig Holdoff

See ___ on page X

Holdoff Type

See ___ on page X

External 1

See ___ on page X

Trigger Level

See ___ on page X

Trig Slope

See ___ on page X

Trig Delay

See ___ on page X

Trig Holdoff

See ___ on page X

Holdoff Type

See ___ on page X

Trig Reference Line

See ___ on page X

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

NOTE In products that run multiple instances of the X-Series Application, all instances use the same location to save User Preset state. So Save User Preset of one instance will overwrite the Save User Preset of another instance.

Key Path	Front-panel key
Backwards Compatibility Notes	User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data. In the X-Series, "state" always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users. On ESA and PSA, User Preset affected the entire instrument's state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode. User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.
Initial S/W Revision	Prior to A.02.00

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.

- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	`:SYSTem:PRESet:USER`
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER
Notes	:SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed
Couplings	A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	`:SYSTem:PRESet:USER:ALL`
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL
Notes	Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state.
Couplings	A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode.

	Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

Key Path	User Preset
Remote Command	`:SYSTem:PRESet:USER:SAVE`
Example	:SYST:PRES:USER:SAVE
Notes	:SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM: STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file.
Initial S/W Revision	Prior to A.02.00

View/Display

Provides access to a menu that enable you to select display parameters for the current measurement.

View Presets affect the trace layout, trace data assignment, scaling and formatting but do not affect hardware measurement setup.

Key Path	Front Panel
Mode	VSA
Remote Command	`:DISPlay:VECTor:VIEW:PRESet SPECtrum|STATistics`
Example	:DISP:VECT:VIEW:PRES SPEC

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

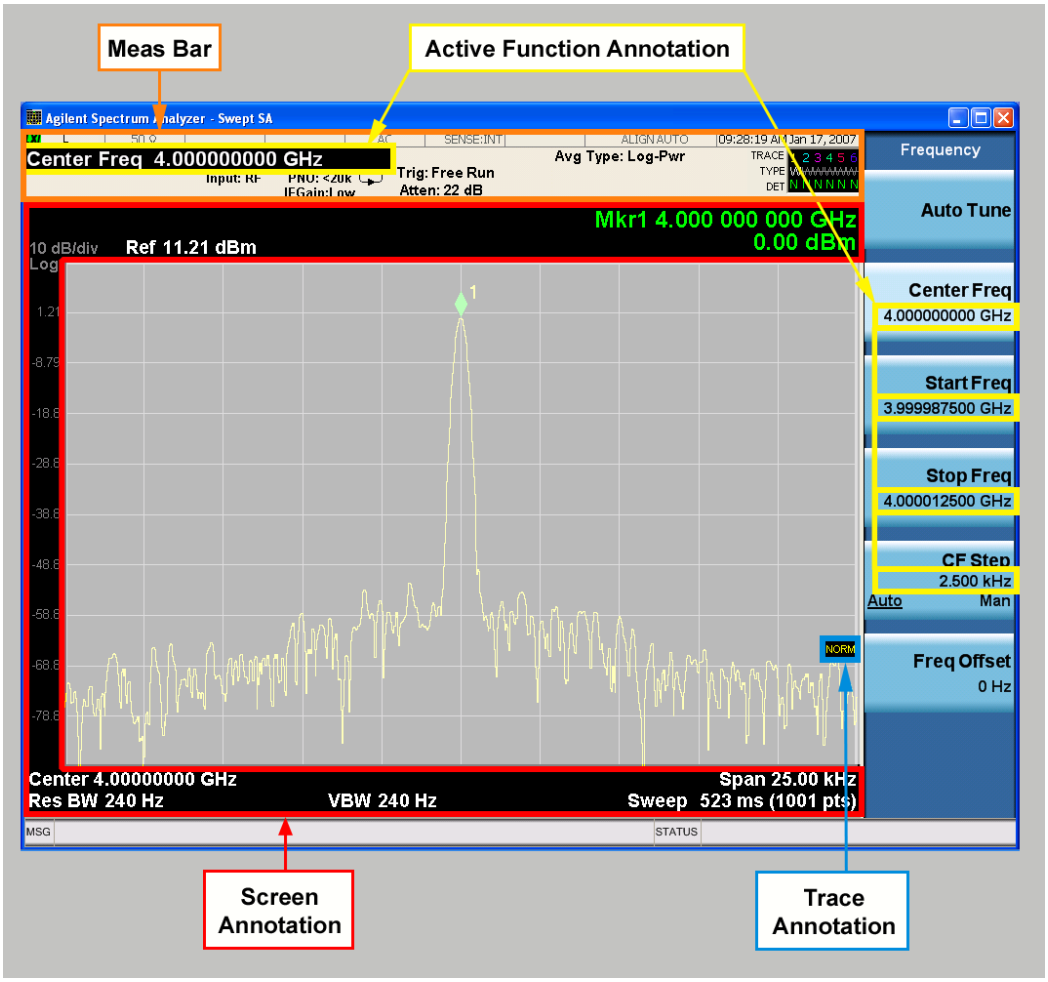
Key Path	Display
Key Path	View/Display
Initial S/W Revision	Prior to A.02.00

Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.



Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

Key Path	View/Display, Display, Annotation
Remote Command	`:DISPlay:ANNotation:MBAR[:STATe] OFF|ON|0|1` `:DISPlay:ANNotation:MBAR[:STATe]?`
Example	DISP:ANN:MBAR OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off.
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Screen

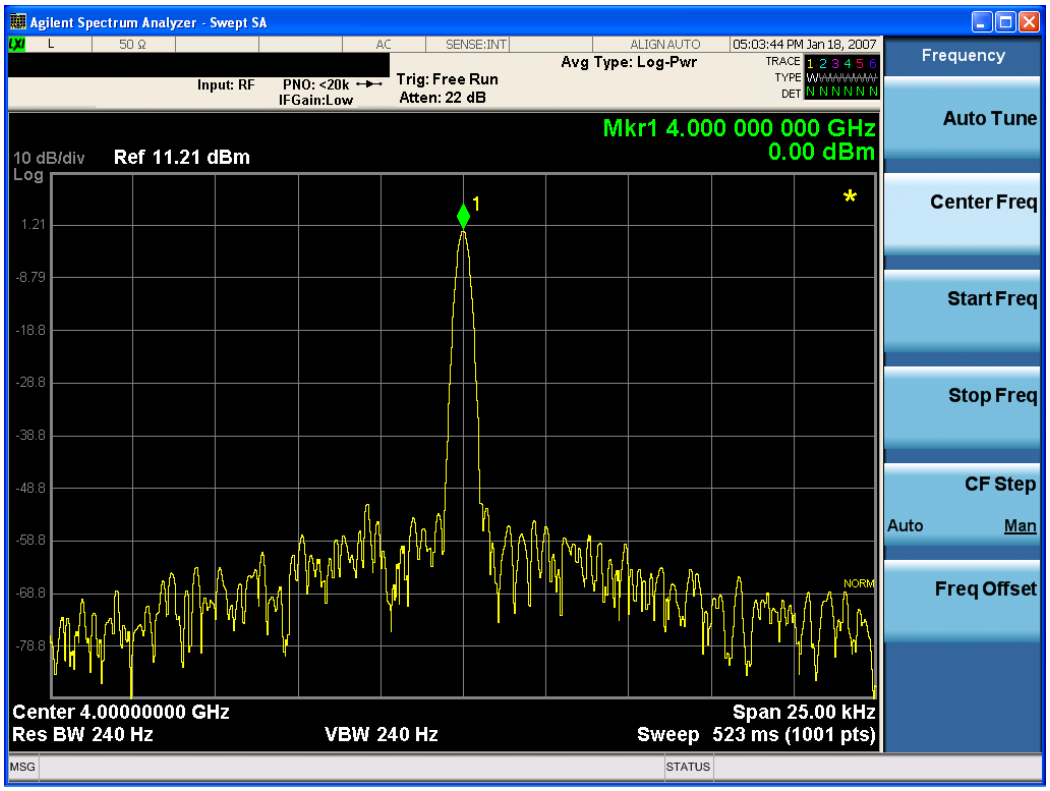
This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

Key Path	View/Display, Display, Annotation
Remote Command	`:DISPlay:ANNotation:SCReen[:STATe] OFF|ON|0|1` `:DISPlay:ANNotation:SCReen[:STATe]?`
Example	DISP:ANN:SCR OFF
Dependencies	Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..



Key Path	View/Display, Display, Annotation
Remote Command	`:DISPlay:ACTivefunc[:STATe] ON|OFF|1|0` `:DISPlay:ACTivefunc[:STATe]?`
Example	DISP:ACT OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Title

Displays menu keys that enable you to change or clear a title on your display.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

Key Path	View/Display, Display, Title
Mode	All
Remote Command	`:DISPlay:<measurement>:ANNotation:TITLe:DATA <string>` `:DISPlay:<measurement>:ANNotation:TITLe:DATA?`
Example	DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title
Notes	Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters.
Preset	No title (measurement name instead)
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

Key Path	View/Display, Display, Title
Example	The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required.
Notes	Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted).
Preset	Performed on Preset.
Initial S/W Revision	Prior to A.02.00

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

Key Path	View/Display, Display
Remote Command	`:DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF|ON|0|1` `:DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]?`
Example	DISP:WIND:TRAC:GRAT:GRID OFF
Notes	The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis.
Preset	On
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

Key Path	View/Display, Display, System Display Settings
Remote Command	`:DISPlay:WINDow[1]:ANNotation[:ALL] OFF|ON|0|1` `:DISPlay:WINDow[1]:ANNotation[:ALL]?`
Example	:DISP:WIND:ANN OFF
Preset	On (Set by Restore Misc Defaults)
State Saved	Not saved in instrument state.
Backwards Compatibility Notes	The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The Themes option is the same as the Themes option under the Display and Page Setup dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	`:MMEMory:STORe:SCReen:THEMe TDColor | TDMonochrome | FCOLor | FMONochrome` `:MMEMory:STORe:SCReen:THEMe?`
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color | 3D Mono | Flat Color | Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

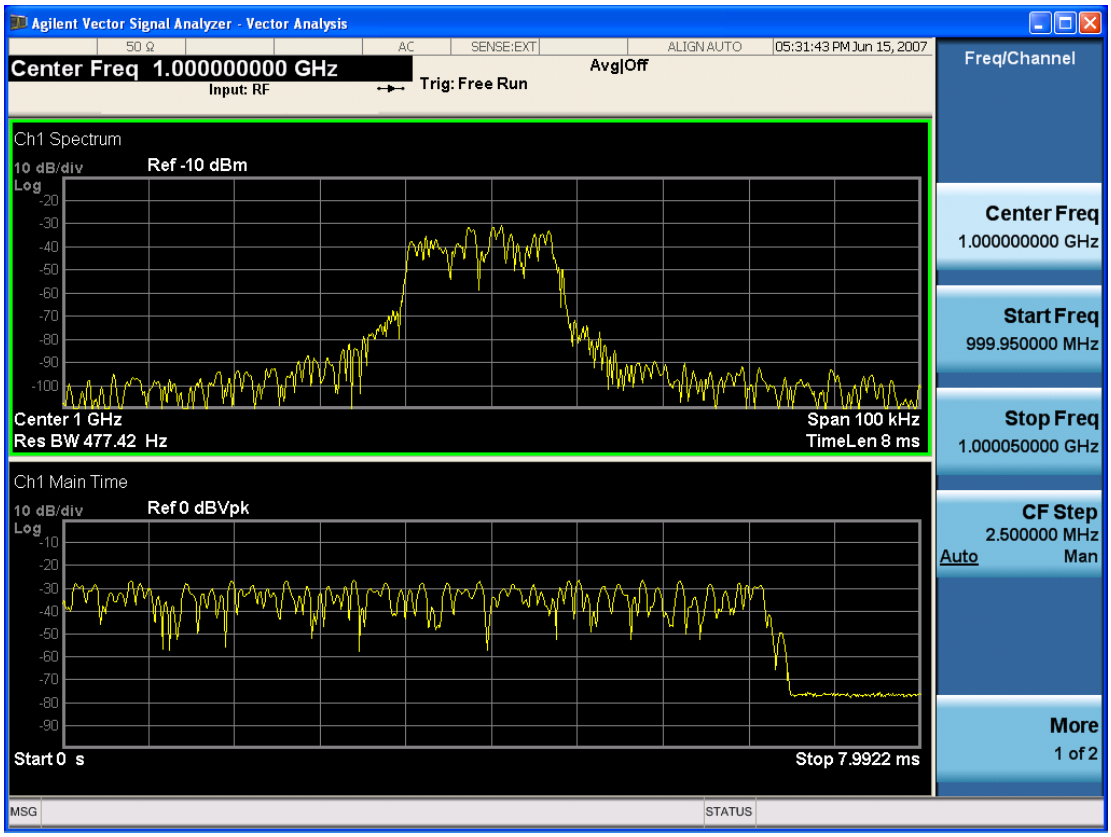
Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Preset View: Spectrum/Time

Displays the Stack 2 layout style (see Layout) with Spectrum in trace 1 and Main Time in trace 2

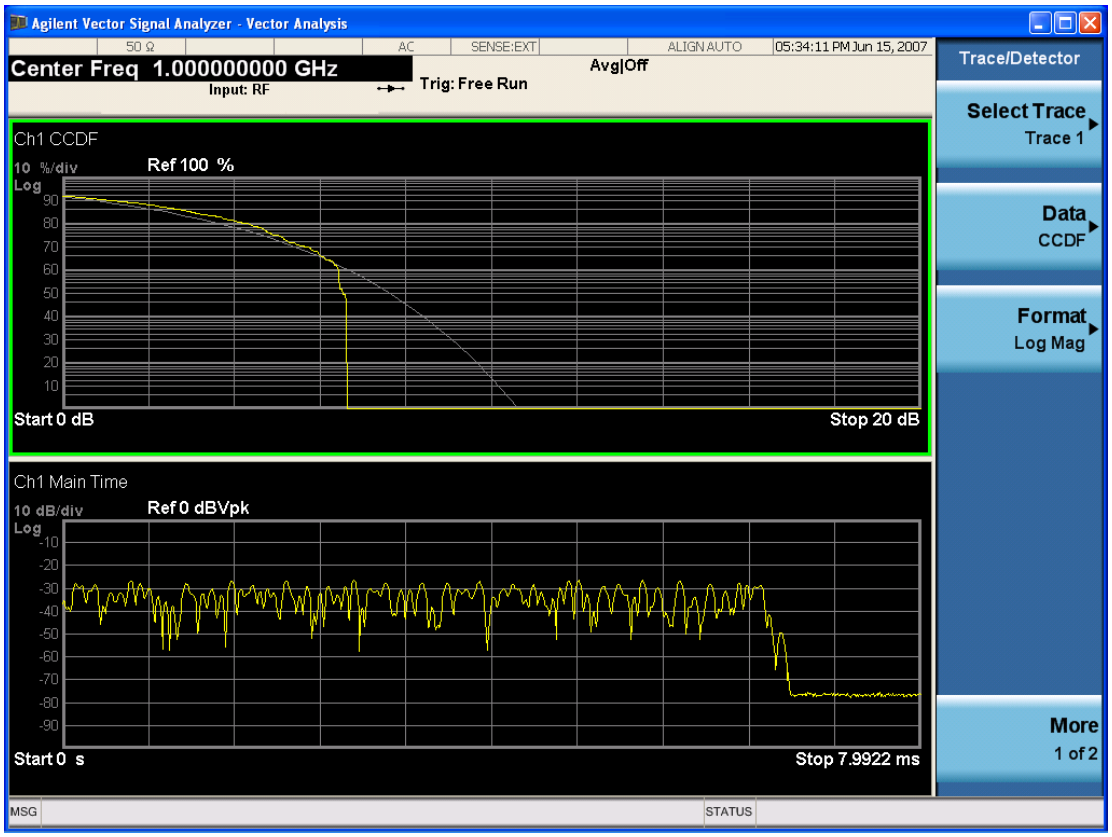
Key Path	View/Display
Mode	VSA



Preset View: Statistics

Displays the Stack 2 layout style (see Layout) with the CCDF in trace 1 and Main Time in trace 2.

Key Path	View/Display
Mode	VSA


Agilent Vector Signal Analyzer - Vector Analysis
50 Ω
AC
SENSE:EXT
ALIGN AUTO
05:34:11 PM Jun 15, 2007
Center Freq 1.000000000 GHz
Input: RF
Trig: Free Run
Avg|Off
Ch1 CCDF
10 %/div
Log
Ref 100 %
90
80
70
60
50
40
30
20
10
Start 0 dB
Stop 20 dB
Ch1 Main Time
10 dB/div
Log
Ref 0 dBVpk
-10
-20
-30
-40
-50
-60
-70
-80
-90
Start 0 s
Stop 7.9922 ms
MSG
STATUS
Trace/Detector
Select Trace
Trace 1
Data
CCDF
Format
Log Mag
More
1 of 2

8 Analog Demod Measurement

The Analog Demod measurement is accessed from the Meas hardkey. The Analog Demod measurement enhances the capabilities offered by Vector Analysis by adding a demodulation function. AM, FM, and PM signals may be demodulated and the output of the demodulator may be further analyzed in the same ways as the input signal. For example, you may look simultaneously at the spectra and time records of the input signal and the demodulated signal. Also available are time gating, autocorrelation, and statistical functions such as CCDF.

This topic contains the following sections:

"Remote Command Results for Analog Demod Measurement" on page 458

"Front Panel Results" on page 459

Remote Command Results for Analog Demod Measurement

The Analog Demod measurement is invoked remotely by the following:

```
:CONFigure:ADEMod
```

```
:CONFigure:ADEMod:NDEFault
```

```
:INITiate:ADEMod
```

Remote results may be obtained using commands from the CALCulate:ADEMod:DATA<n> tree. In addition, the FETCh and READ commands below may be used to obtain ACP and OBW table information when those functions are turned on.

```
:FETCh:ADEMod[n]?
```

```
:READ:ADEMod[n]?
```

The MEASure? command is not supported by the Analog Demod measurement.

For more information and remote commands, see Remote SCPI Commands and Data Queries.

Also see Trace/Detector, Data for more measurement SCPI commands.

Front Panel Results

Analog Demod results may be displayed in any trace and the traces viewed in a variety of layouts that show 1, 2, 3, or 4 traces at a time. Each trace may be scaled as desired regardless of measurement settings or auto-scaled to reflect measurement settings. Data may be formatted in a variety of ways. (For example, you can view the log magnitude of complex data, the real or imaginary part, etc.) You can use View Presets to view frequently used results or to provide a familiar starting point from which you can customize your own view.

Key Path	Meas
Mode	VSA

Res BW

Enables you to select the resolution bandwidth of the measurement. Res BW is mathematically related to Time length and Window type, so changing one of these, directly or indirectly, must change at least one other.

Res BW and Time length are related by the following equation:

Res BW = ENBW / T

where:

ENBW is the normalized effective noise bandwidth of the Window. See FFT Window for more details).

T is the time record length.

Therefore, if you change Res BW, Main Time must also change, and vice versa. (If the Gate function is on, then it is Gate Length, not Main Time, that is related to Res BW by the above equation.)

For convenience, Res BW is by default also coupled to Span (but not vice versa). This coupling can be turned off. See "Res BW Coupling" on page 460 for more details.

Limits:

- The minimum Res Bw to Span ratio is related to the maximum Main Time length, and is given by:

  ENBW / 409600 if Freq points state parameter is set to Auto

  ENBW / (Freq Points – 1) if Freq points parameter is manually set

- The maximum Res BW to Span ratio is related to the minimum time record size (16 points for most windows, 17 points for Flat Top), and is given by:

  ENBW / 12.5

  (ENBW / 13.28125 for Flat Top window)

See "Main Time" on page 655 for more on relationships between Res BW and time.

Key Path	BW
Mode	VSA

Measurement	<meas>:=VECTor|ADEMod|IPOWer|IDEMod|MOTotalk
Remote Command	`[:SENSe]:<meas>:BANDwidth|BWIDth[:RESolution] <bandwidth>` `[:SENSe]:<meas>:BANDwidth|BWIDth[:RESolution]?`
Example	VECT:BWID 200 KHZ VECT:BWID?
Notes	Key blanked in any other measurement than Vector or Analog Demod
Couplings	Changing Main Time or Gate Length changes Res BW. See Res BW Coupling for other changes that can affect (or be affected by) Res BW
Preset	300 kHz
State Saved	Saved in instrument state.
Min	–9.9e37
Max	9.9e37
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Res BW Coupling

Enables you to control how Res BW is affected by other parameters. The three possible settings are:

Span: (default) This setting keeps the ratio of Res BW:Span constant whenever the Span is changed. However, you can change the Res BW at will, and doing so establishes a new Res BW:Span ratio.

Min: This setting is only available when the Freq Points property is manually set, and is disabled (forceful grey out) when Freq Points is Auto. It maintains the RBW at the minimum possible value given the settings for Freq Points, Span, and Window. Res BW coupling is changed from Min to Span if you manually set Res BW.

Fixed: This setting attempts to keep the Res BW setting fixed as Span, Freq Points, or FFT Window type change. Changing FFT Window causes Main Time (or Gate) length to change in order to keep the Res BW Fixed. Res BW coupling is forced to Fixed mode any time you turn the Gate function on or manually set Main Time length. See "Main Time" on page 655 for details.

If a requested change to Res BW or Time Length (Main or Gate) causes the Res BW to go outside the minimum or maximum Res BW: Span limits (see "Res BW" on page 459 for specifics), the Res BW is clipped at the appropriate limit. The Time length is then set according to the limited Res BW.

In Fixed coupling mode, if increasing the Span causes the new Res BW:Span to drop below the minimum, or if decreasing Span would cause the new Res BW:Span to exceed the maximum, the requested Span is accepted and then the Res BW is changed to the limiting value. The associated Time length is updated.

In Fixed or Span coupling, increasing Freq Points does not cause the Main (or Gate) Time Length to increase. It only adds zero padding to the array that is used in the FFT to calculate the Spectrum. Therefore, it does not affect Res BW. If decreasing Freq Points decreases the maximum time length below the current Main Time, then the Main Time length is clipped to the new limits. If Gating is on, the Gate Delay is first limited, then the Gate Length. The Res BW is then updated as a result of the Time changes.

In Fixed or Span coupling, changing the Window Type does not affect RBW unless it falls outside the limits calculated using the new window. Then the Res BW is clipped at the appropriate limit. The associated Time length is also updated.

Key Path	BW
Mode	VSA
Measurement	<meas>:=VECTor|ADEMod|IPOWer|IDEMod|MOTotalk
Remote Command	`[:SENSe]:<meas>:BANDwidth|BWIDth[:RESolution]:COUPle SPAN | MIN | FIXed` `[:SENSe]:<meas>:BANDwidth|BWIDth[:RESolution]:COUPle?`
Example	VECT:BWID:COUP FIX VECT:BWID:COUP?
Notes	Blanked when in any other measurement than Vector or Analog Demod MIN is not available if Freq Points is set to Auto and trying to set it generates error –221 Settings conflict
Couplings	See narrative above table and also "Res BW" on page 459
Preset	SPAN
State Saved	Saved in instrument state.
Range	Span | Min | Fixed
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

Key Path	Front-panel key
Remote Command	`:INITiate:CONTinuous OFF|ON|0|1` `:INITiate:CONTinuous?`
Example	:INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation
Preset	ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF)
State Saved	Saved in instrument state
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep.
Initial S/W Revision	Prior to A.02.00

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until k = N, at which point the current sequence will stop and the instrument will go to the idle state.

File

See "File" on page 176

Input/Output

See "Input/Output" on page 118

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Remote Measurement Functions

This section contains the following topics:

"Measurement Group of Commands" on page 692

"Current Measurement Query (Remote Command Only) " on page 694

"Limit Test Current Results (Remote Command Only)" on page 694

"Data Query (Remote Command Only)" on page 694

"Calculate/Compress Trace Data Query (Remote Command Only)" on page 695

"Calculate Peaks of Trace Data (Remote Command Only)" on page 700

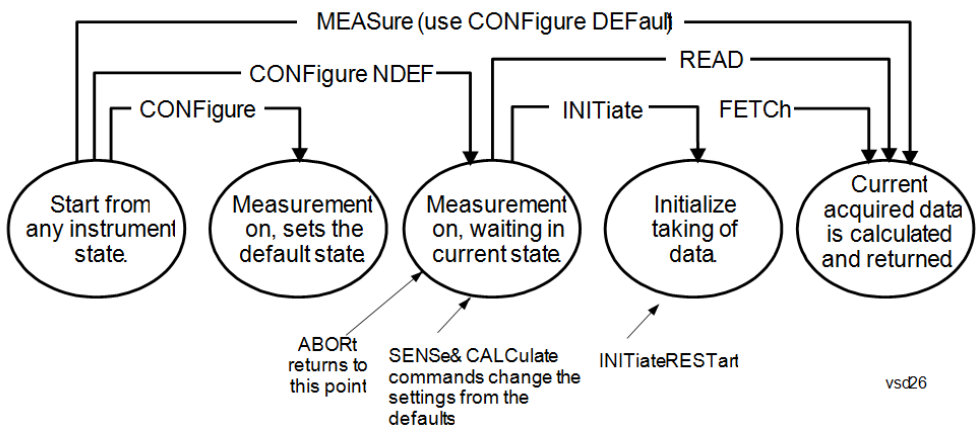
"Hardware-Accelerated Fast Power Measurement (Remote Command Only)" on page 701

"Format Data: Numeric Data (Remote Command Only)" on page 715

"Format Data: Byte Order (Remote Command Only)" on page 716

Initial S/W Revision	Prior to A.02.00

Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFigure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFigure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
- For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
- Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
- If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
- For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
- Blocks other SCPI communication, waiting until the measurement is complete before returning the results
- If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)

Initial S/W Revision	Prior to A.02.00

Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

Remote Command	`:CONFigure?`
Example	CONF?
Initial S/W Revision	Prior to A.02.00

Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

Remote Command	`:CALCulate:CLIMits:FAIL?`
Example	CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails.
Initial S/W Revision	Prior to A.02.00

Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDer and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

Remote Command	`:CALCulate:DATA[n]?`
Notes	The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCh:<measurement>? query where <measurement> is the current measurement.
Initial S/W Revision	Prior to A.02.00

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

Remote Command	`:CALCulate:DATA<n>:COMPress? BLOCk | CFIT | MAXimum | MINimum | MEAN | DMEan | RMS | RMSCubed | SAMPle | SDEViation | PPHase [,<soffset>[,<length>[,<roffset>[,<rlimit>]]]]`
Example	To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.)
Notes	The command supports 5 parameters. Note that the last 4 (<soffset>,<length>,<roffset>,<rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data.
Initial S/W Revision	Prior to A.02.00

- BLOCk or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.
-

NOTE **If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.**

Equation 1

Mean Value of Data Points for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{\text{Xi} \in \text{region(s)}} \text{Xi}$$

where Xi is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{\text{Xi} \in \text{region(s)}} |\text{Xi}|$$

where |Xi| is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$DME = 10 \times \log_{10}\left(\frac{1}{n}\sum_{Xi \in \text{region(s)}} 10^{\frac{Xi}{10}}\right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$RMS = \sqrt{\frac{1}{n}\sum_{Xi \in \text{region(s)}} Xi^2}$$

where Xi is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$RMS = \sqrt{\frac{1}{n}\sum_{Xi \in \text{region(s)}} Xi \; Xi^*}$$

where Xi is the complex value representation of an I/Q pair, Xi* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPle - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEViation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$SDEV = \sqrt{\frac{1}{n} \sum_{Xi \in region(s)} (Xi - \overline{X})^2}$$

where Xi is a data point value, X is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$SDEV = \sqrt{\frac{1}{n} \sum_{Xi \in region(s)} (|Xi| - \overline{X})^2}$$

where |Xi| is the magnitude of an I/Q pair, X is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector (n=0) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

  The rms power of the specified region may be expressed as:

  Power = 10 x log [10 x (RMS I/Q value)] + 10.

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{Xi \in region} Xi \, Xi^*}$$

where Xi is the complex value representation of an I/Q pair, Xi* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

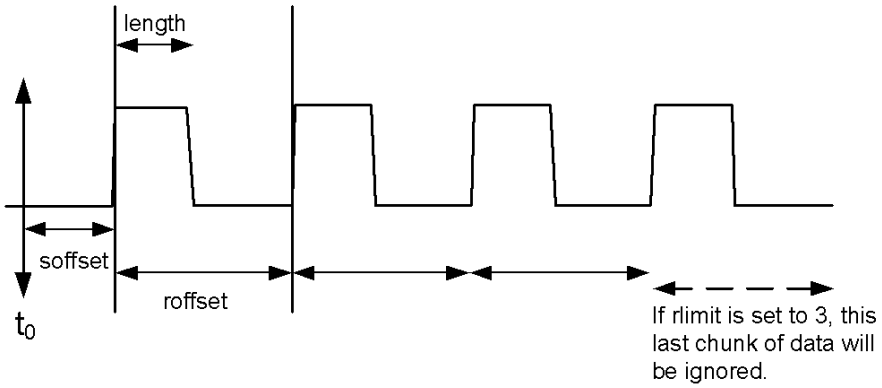
$$\frac{1}{n} \sum_{Yi \in region} Yi$$

where Yi is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

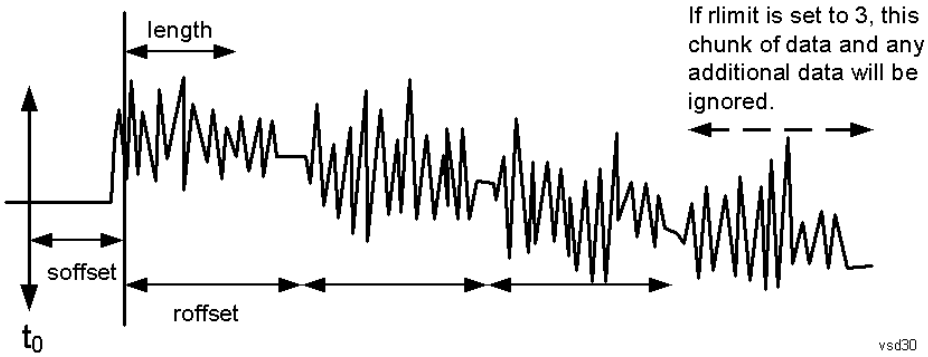
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints – 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints – 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints – 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDer and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

Remote Command	For Swept SA measurement:
	`:CALCulate:DATA[1]|2|...|6:PEAKs? <threshold>,<excursion>[,AMPLitude | FREQuency | TIME[,ALL | GTDLine | LTDLine]]`
	For most other measurements:
	`:CALCulate:DATA[1]|2|...|6:PEAKs? <threshold>,<excursion>[,AMPLitude | FREQuency | TIME]`

Example	Example for Swept SA measurement in Spectrum Analyzer Mode: CALC:DATA4:PEAK? –40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above –40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned. Query Results 1: With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time). If no peaks are found the peak list will consist of only the number of peaks, (0).
Notes	<n> - is the trace that will be used <threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as –200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu. <excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the

	excursion value stored under the Peak Criteria menu. Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL). Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reportedSorting order: AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent) FREQuency - lists the peaks in order of occurrence, left to right across the x-axis. TIME - lists the peaks in order of occurrence, left to right across the x-axis. Peaks vs. Display Line: ALL - lists all of the peaks found (default if optional parameter not sent). GTDLine (greater than display line) - lists all of the peaks found above the display line. LTDLine (less than display line) - lists all of the peaks found below the display line.
Initial S/W Revision	Prior to A.02.00

Hardware-Accelerated Fast Power Measurement (Remote Command Only)

The Fast Power option (FP2) enables very fast channel power measurements for instruments with the prerequisite hardware (DP2 and/or B40). It accomplishes this by peforming real-time overlapped FFTs at the hardware layer, using software for basic post-processing before returning the result to the user. The upshot of this approach is improved throughput for user applications that require many sequential power measurements.

The analysis bandwidth of FP2 is limited by the licenses in the instrument, but its maximum overall analysis bandwidth per acquisition is 40 MHz.

FP2 is remote-only, which means the instrument does not switch to any particular mode or measurement. FP2 commands can be sent while another application is in use on the front panel.

Each Fast Power measurement can be predefined using an array index, and up to 1,000 measurements can be stored. In the following documentation, instances of [1,2,...,999] can be substituted with a particular measurement index, e.g. CALC:FPOW:POW1?, CALC:FPOW:POW2?, CALC:FPOW:POW134?. In this way, power measurements can be defined one time in a batch, and then executed multiple times without having to redefine them, similar to “list mode” on other measurements.

In addition to basic channel power measurements, there are a number of other measurement “functions” for each channel, including peak power, peak frequency, and power spectral density. See the Function parameter for more information.

Reset Fast Power Measurement (Remote Command Only)

Resets the measurement configuration to the defaults.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:RESet`
Example	:CALC:FPOW:POW1:RES

Notes	Option FP2 is required.
Initial S/W Revision	A.14.00

Define Fast Power Measurement (Remote Command Only)

Fast Power acquisitions are configured using the DEFine command. This command accepts a comma-delimited string of configuration parameters and their appropriate values, which are all specified in the subsection below.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:DEFine "configuration string"`
Example	:CALC:FPOW:POW1:DEF "CenterFrequency=2e9, AcquisitionTime=0.005"
Notes	See below for a list of measurement variables that can be defined in the configuration string.
Initial S/W Revision	A.14.00

Acquisition Time

Example	CALC:FPOW:POW1:DEF "AcquisitionTime=0.002"
Notes	The acquisition time parameter sets the time in which the entire spectrum is measured. An increase in the acquisition time yields an improvement in measurement repeatability.
Preset	0.001 s
Range	0 s to 1 s
Default Unit	Time (s)
Initial S/W Revision	A.14.00

Center Frequency

Example	CALC:FPOW:POW1:DEF "CenterFrequency=2e9"
Notes	The center frequency parameter sets the frequency in which the measurement is centered around. The OffsetFrequency parameter is calculated relative to the center frequency.
Preset	1 GHz
Range	0 Hz to maximum instrument frequency
Default Unit	Frequency (Hz)
Initial S/W Revision	A.14.00

DC Coupled

Example	CALC:FPOW:POW1:DEF "DCCoupled=True"
Notes	The DC coupled parameter allows the user to specify whether the DC blocking capacitor is utilized. Set parameter to true when measuring frequencies below 10 MHz.
Preset	False
Range	True (DC Coupled) or False (AC Coupled)
Default Unit	Boolean
Initial S/W Revision	A.14.00

DetectorType

Example	CALC:FPOW:POW1:DEF "DetectorType=Peak"
Notes	Option FP2 is required. The detector type parameter allows the user to choose whether a RMS average or peak value is used during the measurement.
Preset	RmsAverage
Range	RmsAverage, Peak
Initial S/W Revision	A.14.00

Do Noise Correction

Example	CALC:FPOW:POW1:DEF "DoNoiseCorrection=True"
Notes	When noise correction is enabled, the linear noise power contributed by the analyzer is subtracted from all measurements. This effectively lowers the noise floor of the analyzer. When noise correction is enabled, the first measurement for a given set of input parameters will take extra time. This is because the analyzer takes an extra acquisition with the RF input disconnected from the analyzer's front end to measure the noise of just the analyzer. The measured noise floor is stored in a cache so the noise acquisition will occur only once for the same state settings. In other words, if noise correction was turned on and the analyzer made an acquisition at frequency A, then frequency B, and back again to frequency A, the hidden initial noise floor acquisition would only occur for the first acquisition at frequency A and the cached noise floor would be used the second time frequency A was measured.
Preset	False
Range	True (enable noise correction) or False (disable noise correction)
Default Unit	Boolean
Initial S/W Revision	A.14.00

Do Spur Suppression

Example	CALC:FPOW:POW1:DEF "DoSpurSuppression=True"
Notes	When measuring very low level signals, or when large out-of-band inputs are input into the analyzer, sometimes unwanted spurs and residuals can appear in the measured spectrum. Spur suppression is a method to help minimize the levels of these internally generated spurs and residuals. When spur suppression is enabled, the analyzer will automatically take two acquisitions using two different internal analog LO frequencies. The FFT spectrums from both acquisitions are combined by taking the minimum power between both traces on a per FFT bin basis. External signals will have the same amplitude for both traces and therefore will return the expected amplitudes. However, low level spurs and residuals generated internally to the analyzer tend to move to different FFT bins depending on the internal analog LO frequency used, and therefore tend to be suppressed using this spur suppression method. Because two acquisitions, rather than a single acquisition, are made when spur suppression is enabled, the measurement time will always be slower when spur suppression is enabled.
Preset	False
Range	True (enable spur suppression) or False (disable spur suppression)
Default Unit	Boolean
Initial S/W Revision	A.14.00

Electronic Attenuator Bypass

Example	CALC:FPOW:POW1:DEF "ElecAttBypass =False"
Notes	The electronic attenuation bypass parameter allows the user to either utilize or bypass the electronic attenuator. The electronic attenuator is only available for frequencies up to 3.6 GHz. Set parameter to true when using frequencies above 3.6 GHz and set the parameter to false when using the preamp.
Preset	True
Range	True (bypass electronic attenuator) or False (use electronic attenuator)
Default Unit	Boolean
Initial S/W Revision	A.14.00

Electronic Attenuation

Example	CALC:FPOW:POW1:DEF "ElecAttenuation=10"
Notes	Option EA3 is required. The electronic attenuation value parameter sets the amount of electrical attenuation from 0 to 24 dB (1 dB steps). Set "ElecAttBypass=False" to make sure the electronic attenuator path is enabled.
Preset	0 dB
Range	0 – 24 dB (1 dB steps)

Default Unit	dB
Initial S/W Revision	A.14.00

IF Gain

Example	CALC:FPOW:POW1:DEF "IFGain=10"
Notes	The IF gain parameter allows the user to specify the gain at the IF stage anywhere from –6 to 16 dB (1 dB steps). This is an advanced feature, and for most cases this should remain at its default value of 0 dB.
Preset	0 dB
Range	–6 – 16 dB (1 dB steps)
Default Unit	dB
Initial S/W Revision	A.14.00

IF Type

Example	CALC:FPOW:POW1:DEF "IFType=B25M"
Notes	The IF type parameter allows the user to select between different IF paths. For example, if the signal is less than 25 MHz wide, then the user can select the B25M path to take advantage of additional filtering on this analog IF path.
Preset	B40M
Range	B10M, B25M, B40M
Initial S/W Revision	A.14.00

Include Power Spectrum

Example	CALC:FPOW:POW1:DEF "IncludePowerSpectrum=True"
Notes	The power spectrum parameter allows the user to read data on the entire spectrum for diagnostic purposes. It is not recommended for production use. See CALC:FPOW:POW[n]:READ2? for details on the binary format of the response.
Preset	False
Range	True (return both channel power and full power spectrum) or False (returns only channel power)
Default Unit	Boolean
Initial S/W Revision	A.14.00

Mechanical Attenuation

Example	CALC:FPOW:POW1:DEF "MechAttenuation=10"
Notes	The mechanical attenuation value parameter sets the amount of mechanical attenuation anywhere from 0 to 70 dB (2 dB steps).
Preset	0 dB
Range	0 – 70 dB (2 dB steps)
Default Unit	dB
Initial S/W Revision	A.14.00

Preamp Mode

Example	CALC:FPOW:POW1:DEF "PreAmpMode=Low"
Notes	The license for the appropriate preamp is required. The preamp mode parameter specifies whether the preamps are being utilized. Low allows any preamps up to 3.6 GHz, and Full allows all licensed preamps. Set "ElecAttBypass=True" in order to utilize any preamps.
Preset	Off
Range	Off, Low, Full
Initial S/W Revision	A.14.00

Resolution Bandwidth Mode

Example	CALC:FPOW:POW1:DEF "PreAmpMode=Low"
Notes	The resolution bandwidth mode parameter allows the user to choose whether the RBW filter is automatically or manually set. The BestSpeed value minimizes measurement time, while the Narrowest value minimizes RBW size (minimum of two FFT bins per RBW). To manually specify an RBW, set this parameter to Explicit, and set the ResolutionBW parameter to the desired value.
Preset	BestSpeed
Range	BestSpeed, Narrowest, Explicit
Initial S/W Revision	A.14.00

Resolution Bandwidth

Example	CALC:FPOW:POW1:DEF "ResolutionBW=25e3"
Notes	The resolution bandwidth parameter sets the 3-dB bandwidth of the RBW filter. The ResolutionBWMode parameter must be set to Explicit in order to manually set the RBW.

Preset	0 Hz
Default Unit	Hz
Initial S/W Revision	A.14.00

Trigger Delay

Example	CALC:FPOW:POW1:DEF "TriggerDelay=0.025"
Notes	The trigger delay parameter sets the time after an external trigger is detected until the measurement is performed.
Preset	0 s
Range	0 – 1 s
Default Unit	Seconds
Initial S/W Revision	A.14.00

Trigger Level

Example	CALC:FPOW:POW1:DEF "TriggerLevel=2"
Notes	The trigger level parameter sets the voltage value at which an external trigger is detected.
Preset	1.2 V
Range	–5 to 5 V
Default Unit	Volts
Initial S/W Revision	A.14.00

Trigger Slope

Example	CALC:FPOW:POW1:DEF "TriggerSlope=Negative"
Notes	The trigger slope parameter indicates the direction of the edge trigger voltage for detection.
Preset	Positive
Range	Positive, Negative
Initial S/W Revision	A.14.00

Trigger Source

Example	CALC:FPOW:POW1:DEF "TriggerSource=Ext1"
Notes	The trigger source parameter allows the user to choose between measurement's triggering freely or controlled by an external input. Ext1 and Ext2 correspond to Trigger 1 In and Trigger 2 In, respectively.
Preset	Free
Range	Free, Ext1, Ext2
Initial S/W Revision	A.14.00

Trigger Timeout

Example	CALC:FPOW:POW1:DEF "TriggerTimeout=0.1"
Notes	The trigger timeout parameter sets the time in which the analyzer will wait for a trigger before automatically performing the measurement.
Preset	1 s
Range	0 – 1 s
Default Unit	Seconds
Initial S/W Revision	A.14.00

Signal Input

Example	CALC:FPOW:POW1:DEF "SignalInput=Fp50MHzCW"
Notes	The signal input parameter allows the user to select between using the main RF input or the internal analyzer reference CW signal of 50 MHz.
Preset	FpMainRf
Range	FpMainRf, Fp50MHzCW
Initial S/W Revision	A.14.00

Use Preselector

Example	CALC:FPOW:POW1:DEF "UsePreSelector=True"
Notes	The preselector parameter allows the user to either utilize or bypass the front end tunable filter at frequencies above 3.6 GHz. For frequencies below 3.6 GHz, the preselector is automatically bypassed, so you do not need to set this parameter to False in those cases.
Preset	False
Range	True (use preselector above 3.6 GHz), or False (preselector bypassed)

Default Unit	Boolean
Initial S/W Revision	A.14.00

Channel Bandwidth Array

Example	CALC:FPOW:POW1:DEF "Bandwidth=[3.84e6, 5e6, 3.84e6]"
Notes	The bandwidth parameter array defines the bandwidth of each channel that will be measured. All array parameters should have the same number of elements. Alternatively, if all the elements are the same value, a single number with no square brackets can be used to define the parameter.
Preset	[1e6]
Range	0 to 40 MHz
Default Unit	Hz
Initial S/W Revision	A.14.00

Channel Filter Type Array

Example	CALC:FPOW:POW1:DEF "FilterType=[RRC, IBW, RRC]"
Notes	The filter type parameter allows the user to choose between an integration bandwidth (IBW) filter or a root-raised-cosine (RRC) filter. The integration bandwidth filter weighs all frequencies within the bandwidth equally. The root-raised-cosine filter has an associated shape parameter, defined by the FilterAlpha parameter. All array parameters should have the same number of elements. Alternatively, if all the elements are the same value, a single value with no square brackets can be used to define the parameter.
Preset	[IBW]
Range	IBW, RRC
Initial S/W Revision	A.14.00

Channel Filter Alpha Array

Example	CALC:FPOW:POW1:DEF "FilterAlpha=[0.5, 0.0, 0.5]"
Notes	The filter alpha parameter allows the user to adjust the alpha value associated with the root-raised-cosine (RRC) filter type. Set FilterType to RRC in order to utilize this parameter. All array parameters should have the same number of elements. Alternatively, if all the elements are the same value, a single number with no square brackets can be used to define the parameter.
Preset	[0.22]
Range	0.0 – 1.0
Initial S/W Revision	A.14.00

Channel Measurement Function Array

Example	CALC:FPOW:POW1:DEF "Function=[BandPower, PeakPower, BandPower]"
Notes	This parameter array defines what measurement is being made for each individually-specified channel: BandPower: Total power within the specified bandwidth of the channel (dBm) BandDensity: Total power density within the specified bandwidth of the channel (dBm/Hz) PeakPower: The peak power value within the specified bandwidth of the channel (dBm) PeakFrequency: The frequency which corresponds to the peak power value within the specified bandwidth of the channel. This frequency is relative to the center frequency (Hz) XdBBandwidth: The half power (–3.01 dB) bandwidth of the highest amplitude signal that resides within the channel (Hz), dB is configurable using XdBBandwidth parameter OccupiedBandwidth: The bandwidth at which 99% of the total power resides within the channel (Hz), percentage configurable using OccupiedBandwidthPercent parameter All array parameters should have the same number of elements. Alternatively, if all the elements are the same value, a single value with no square brackets can be used to define the parameter.
Preset	[BandPower]
Range	BandPower, BandDensity, PeakPower, PeakFrequency, XdBBandwidth, OccupiedBandwidth
Initial S/W Revision	A.14.00

Channel Offset Frequency Array

Example	CALC:FPOW:POW1:DEF "OffsetFrequency=[–5e6, 0, 5e6]"
Notes	The offset frequency parameter array defines the difference between the center frequency to the center frequency of each channel. All array parameters should have the same number of elements.
Preset	[0]
Range	0 to 20 MHz
Default Unit	Hz
Initial S/W Revision	A.14.00

Channel Occupied Bandwidth Percent Array

Example	CALC:FPOW:POW1:DEF "OccupiedBandwidthPercent =[0.95, 0.95, 0.95]"
Notes	This parameter only applies for channels whose Function is set to OccupiedBandwidth. The occupied bandwidth percent parameter specifies the percent of total power in these channels. The valid range for this parameter is 0.0 to 1.0, where 1.0 represents 100%. The default for this parameter is 0.99, which will return the bandwidth that contains 99% of the total channel power.

Preset	[0.99]
Range	0 – 1.0
Initial S/W Revision	A.14.00

Channel x-dB Bandwidth Array

Example	CALC:FPOW:POW1:DEF " XdBBandwidth =[–6.02, –3.01, –1.0]"
Notes	This parameter only applies for channels whose Function is set to XdBBandwidth. The X dB bandwidth parameter is used to specify the power relative to the peak channel power over which the bandwidth is calculated. The parameter value must be a negative number.
Preset	[–3.01]
Range	–200 to 0 dB
Default Unit	dB
Initial S/W Revision	A.14.00

Define Fast Power Measurement Query (Remote Command Only)

The DEFine? command is used to retrieve a list of all defined parameters in an ASCII string format

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:DEFine?`
Example	:CALC:FPOW:POW1:DEF?

ple	
Notes	This command query is used to retrieve a list of all defined parameters in an ASCII format. The following is an example of the returned results: "DCCoupled=False,ElecAttBypass=True,ElecAttenuation=0,IFGain=0,MechAttenuation=0,PreAmpMode=Off,PreSelectorOffset=0,UsePreSelector=False,ExternalReferenceFrequency=10000000,FrequencyReferenceSource=AutoExternalFrequencyReference,IFType=B40M,LOMode=SLW,SignalInput=FpMainRf,AcquisitionTime=0.001,CenterFrequency=1000000000,ResolutionBW=0,ResolutionBWMode=BestSpeed,DetectorType=RmsAverage,Bandwidth=[1000000],OffsetFrequency=[0],Function=[BandPower],FilterType=[IBW],FilterAlpha=[0.22],OccupiedBandwidthPercent=[0.99],XdBBandwidth=[-3.01],DoNoiseCorrection=False,DoSpurSuppression=False,MeasurementMethod=HardwareFFT,IncludePowerSpectrum=False,TriggerDelay=0,TriggerLevel=1.2,TriggerSlope=Positive,TriggerSource=Free,TriggerTimeout=1"
Initial S/W Revision	A.14.00

Configure Fast Power Measurement (Remote Command Only)

The configure command begins hardware setup and returns immediately, with no acquisition made. This can be used in parallel with other hardware operations to effectively hide the hardware setup time.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:CONFigure`
Example	:CALC:FPOW:POW1:CONF
Notes	Option FP2 is required.
Initial S/W Revision	A.14.00

Initiate Fast Power Measurement (Remote Command Only)

The INITiate command begins an acquisition and returns immediately. The results of the measurement can be retrieved using FETCh.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:INITiate`
Example	:CALC:FPOW:POW1:INIT
Notes	Option FP2 is required.
Initial S/W Revision	A.14.00

Fetch Fast Power Measurement (Remote Command Only)

The FETCh command query is used to retrieve the results of an acquisition initiated by the INIT command. The returned results are in ASCII string format. The string begins and ends with quotation marks.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:FETCh?`
Example	:CALC:FPOW:POW1:FETC?
Notes	Option FP2 is required. Returns m comma-separated ASCII values, where m corresponds to the number of bandwidths defined. 1. Declared function return in the 1st specified channel 2. Declared function return in the 2nd specified channel ... m. Declared function return in the last specified channel The INIT and FETC? command sequence performs the same functionality of a single CALC:FPOW:POW[n]? query. Units of the returned values are dependent on the Function parameter for each channel.
Initial S/W Revision	A.14.00

Execute Fast Power Measurement (Remote Command Only)

This command query is used as shorthand for an INIT command immediately followed by a FETC? command. The returned results are in ASCII string format. The string begins and ends with quotation marks.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]?`
Example	:CALC:FPOW:POW1?
Notes	Option FP2 is required. See notes for Fast Power Fetch for return format.
Initial S/W Revision	A.14.00

Binary Read Fast Power Measurement (Remote Command Only)

This command query is used as shorthand for an INIT command immediately followed by a FETC? command. The returned results are in a binary format.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:READ?` `:CALCulate:FPOWer:POWer[1,2,…,999]:READ1?`
Example	:CALC:FPOW:POW1:READ? :CALC:FPOW:POW1:READ1?
Notes	Option FP2 is required. Returns m 4 byte floating point binary values (Little-Endian), where m corresponds to the number of bandwidths defined.
Initial S/W Revision	A.14.00

Diagnostic Binary Read Fast Power Measurement (Remote Command Only)

This command query is used as shorthand for an INIT command immediately followed by a FETC? command. The returned results are in a binary format. This command is used primarily for diagnostic purposes to test for ADC overloads and to visibly inspect the spectrum.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:READ2?`
Example	:CALC:FPOW:POW1:READ2?
Notes	Option FP2 is required. Note: Spectrum data is only returned if the IncludePowerSpectrum parameter is set to True. If IncludePowerSpectrum is False, the number of spectrum points will be zero (0). Units of the returned values are dependent on the Function parameter per channel (e.g. dBm for BandPower, Hz for PeakFrequency). Returns binary data (Little-Endian) that contains information on m amount of channels, along with ADC over range and full spectrum data. The following is the binary format of the response. Bandwidth Return Value 1. Number of channels specified, m [4 byte int] 2. Declared function result for the 1st specified channel [4 byte float] 3. Declared function result for the 2nd specified channel [4 byte float] ... (m + 1). Declared function result for the last (mth) specified channel [4 byte float] ADC Over Range 1. ADC over-range occurred (1: true, 0: false) [2 byte short]

	Spectrum Data 1. Number of points in the spectrum data, k [4 byte int] 2. Start frequency of spectrum data (Hz) [8 byte double] 3. Step frequency of spectrum data (Hz) [8 byte double] 4. FFT bin at 1st point (dBm) [4 byte float] 5. FFT bin at 2nd point (dBm) [4 byte float] ... (k + 3). FFT bin at last (kth) point (dBm) [4 byte float]
Initial S/W Revision	A.14.00

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command	`:FORMat[:TRACe][:DATA] ASCii|INTeger,32|REAL,32 |REAL,64` `:FORMat[:TRACe][:DATA]?`
Notes	The query response is: ASCii: ASC,8 REAL,32: REAL,32 REAL,64: REAL,64 INTeger,32: INT,32 When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm). The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.
Dependencies	Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL). Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message –161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message –121 "Invalid Character in Number".
Preset	ASCii
Backwards Compatibility Notes	Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.
Initial S/W Revision	Prior to A.02.00

The specs for each output type follow:

ASCii - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

Remote Command	`:FORMat:BORDer NORMal|SWAPped` `:FORMat:BORDer?`
Preset	NORMal
Initial S/W Revision	Prior to A.02.00

Demod Setup

Enables you to set Demodulation parameters for the current measurement.

Key Path	Meas Setup
Mode	VSA

Demod Type

Enables you to select the type of analog demodulation to be applied to your signal. You can select AM, PM, or FM demodulation. In addition, you can enable Auto Carrier Phase and/or Auto Carrier Frequency. Auto carrier controls how the analyzer determines your carrier frequency.

Key Path	Meas Setup, Demod Setup
Mode	VSA
Remote Command	`[:SENSe]:ADEMod:MODulation AM|FM|PM` `[:SENSe]:ADEMod:MODulation?`
Example	ADEM:MOD AM ADEM:MOD?
Preset	AM
State Saved	Saved in instrument state.
Range	AM | FM | PM

AM Units

Enables you to select whether the display units for AM demodulation are in normalized units ("am") or percent ("%").

Key Path	Meas Setup, Demod Setup
Mode	VSA
Remote Command	`[:SENSe]:ADEMod:AM:UNIT AM|PCT` `[:SENSe]:ADEMod:AM:UNIT?`
Example	ADEM:AM:UNIT AM ADEM:AM:UNIT?
Notes	Greyed out if Demod Type is FM or PM
Preset	AM
State Saved	Saved in instrument state.
Range	am | %

Auto Carrier Freq

Enables you to turn on or off automatic carrier frequency estimation for FM or PM demodulation. When Auto Carrier Freq is off, the analyzer uses the Center Frequency setting as the carrier. If the actual carrier frequency is different from the center frequency, a ramp is visible in the phase results. Turning on Auto Carrier Freq causes the analyzer to estimate the actual carrier frequency. Proper setting of the carrier frequency is especially important in PM demodulation.

When the VSA is in analog demodulation mode, you can select one of two different types of auto carrier setting. The types of auto carrier setting available depends on the type of demodulation, as shown in the following table.

For this demodulation:	You can use this auto carrier:
AM	None
FM	Auto Carrier Frequency
PM	Auto Carrier Frequency and Auto Carrier Phase

Note that you cannot select auto carrier frequency with AM demodulation. AM demodulation does not require carrier frequency estimation because the AM calculations are based on the carrier envelope. The carrier amplitude estimate is based on data within a single time record and is updated on a record-by-record basis.

Auto Carrier Frequency

Accurate angle demodulation (FM or PM) depends on precisely identifying the carrier frequency. Errors result in phase ramping. The arc tangent of the complex time record is the basis of both PM and FM demodulation. Hence, correcting for the phase ramp is the goal of auto carrier frequency.

Without auto carrier frequency, the analyzer uses its center frequency to determine the carrier frequency of your signal. When auto carrier frequency is selected, the analyzer uses an algorithm to estimate the carrier frequency. If you can lock the analyzer to an external reference which is coherent with your carrier, no carrier frequency estimation is needed, and you do not need to select auto carrier frequency.

When auto carrier frequency is selected, the carrier frequency estimate is calculated independently for each time record, and is used in the demodulation calculation to take out FM offsets, or PM phase ramps due to error between your carrier frequency and the analyzer's LO (center frequency).

NOTE **If auto carrier frequency is selected, you can select demod carrier to display the estimated carrier frequency for FM demodulation. Cross channel results show the estimates for both channels. For PM demodulation, you must select both Auto Carrier Frequency and Auto Carrier Phase to display the estimated carrier frequency.**

Auto Carrier Frequency and Averaging

The operation of auto carrier frequency is modified if averaging is turned on. For FM measurements, the carrier frequency estimate from the current time record is fed into an exponential average of estimates from prior time records. The resulting, averaged carrier-frequency is used to compensate the current time record for carrier-frequency offsets from the center frequency.

Considerations When Using Auto Carrier Frequency

The following situations can bias the phase ramp estimation:

- Low frequency modulation, such as a periodic signal with fewer than 10 cycles over the time record.
- Phase discontinuities present in digital communication formats.
- Transients, such as carrier turn-on in the middle of the time record.

In cases where biases are unavoidable, auto carrier frequency should be turned off. Where possible, lock the analyzer's external reference to a reference coherent with the carrier to eliminate frequency errors.

Key Path	Meas Setup, Demod Setup
Mode	VSA
Remote Command	`[:SENSe]:ADEMod:CARRier:FREQuency:AUTO OFF|ON|0|1` `[:SENSe]:ADEMod:CARRier:FREQuency:AUTO?`
Example	ADEM:CARR:FREQ:AUTO ON ADEM:CARR:FREQ:AUTO?
Notes	Greyed out if Demod Type is AM
Preset	OFF
State Saved	Saved in instrument state.

When Auto Carrier Frequency is on (for Demod types FM or PM), the calculated average carrier frequency may be queried for any trace showing a demod result by using the following SCPI command.

Key Path	SCPI only
Mode	VSA
Remote Command	`:DISPlay:ADEMod:TRACe[1]|2|...|4:CARRier:FREQuency?`
Example	DISP:ADEM:TRAC:CARR:FREQ?
Remote Command Notes	This returns the result of the carrier frequency calculation (if Demod Mode is FM or PM and Auto Carrier Freq is on) for the addressed trace (which must be assigned a demod result). Returns NaN otherwise.

Auto Carrier Phase

Enables you to turn on or off automatic carrier phase offset estimation for PM demodulation. Even with Auto Carrier Freq turned on, the PM demodulation may have a fixed or slowly varying phase offset. This function estimates the phase offset and takes it out. A phase offset does not affect FM results, because the offset differentiates to zero.

Key Path	Meas Setup, Demod Setup
Mode	VSA
Remote Command	`[:SENSe]:ADEMod:CARRier:PHASe:AUTO OFF|ON|0|1` `[:SENSe]:ADEMod:CARRier:PHASe:AUTO?`
Example	ADEM:CARR:PHAS:AUTO ON ADEM:CARR:PHAS:AUTO?
Notes	This is robust enough that it sometimes works even if Auto Carrier Freq is turned off, but it is recommended that you turn on Auto Carrier Freq along with this. Greyed out if Demod Type is AM or FM
Preset	OFF
State Saved	Saved in instrument state.

Meas Preset

Immediately sets all measurement parameters to their Preset values.

Key Path	Meas Setup
Mode	VSA
Remote Command	`:CONFigure:ADEMod`
Example	CONF:ADEM

Mode

See "Mode" on page 152

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings
- See "How-To Preset" on page 498 for more information.

Key Path	Front-panel key
Remote Command	`:SYSTem:PRESet`
Example	:SYST:PRES
Notes	*RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0.
Couplings	A Mode Preset aborts the currently running measurement, activates the default measurement, and. gets the mode to a consistent state with all of the default couplings set.
Backwards Compatibility Notes	In the X-Series, the legacy “Factory Preset” has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no “Preset Type” as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using

	User Preset.
Initial S/W Revision	Prior to A.02.00

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

Type Of Preset	SCPI Command	Front Panel Access
Auto Couple	:COUPle ALL	Auto Couple front-panel key
Meas Preset	:CONFigure:<Measurement>	Meas Setup Menu
Mode Preset	:SYSTem:PRESet	Mode Preset (green key)
Restore Mode Defaults	:INSTrument:DEFault	Mode Setup Menu
Restore All Mode Defaults	:SYSTem:DEFault MODes	System Menu; Restore System Default Menu
*RST	*RST	not possible (Mode Preset with Single)
Restore Input/Output Defaults	:SYSTem:DEFault INPut	System Menu; Restore System Default Menu
Restore Power On Defaults	:SYSTem:DEFault PON	System Menu; Restore System Default Menu
Restore Alignment Defaults	:SYSTem:DEFault ALIGn	System Menu; Restore System Default Menu
Restore Miscellaneous Defaults	:SYSTem:DEFault MISC	System Menu; Restore System Default Menu
Restore All System Defaults	:SYSTem:DEFault [ALL] :SYSTem:PRESet:PERSistent	System Menu; Restore System Default Menu
User Preset	:SYSTem:PRESet:USER	User Preset Menu
User Preset All Modes	:SYSTem:PRESet:USER:ALL	User Preset Menu

Power On Mode Preset	:SYSTem:PON:TYPE MODE	System Menu
Power On User Preset	:SYSTem:PON:TYPE USER	System Menu
Power On Last State	:SYSTem:PON:TYPE LAST	System Menu

Mode Setup

See "Mode Setup" on page 171

Print

See "Print" on page 181

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

Type	Default Prefix	Menu
State	State_	(Save/Recall)
Trace + State	State_	(Save/Recall)
Screen	Screen_	(Save/Recall)
Amplitude Corrections	Ampcor_	(Import/Export)
Traces	Trace_	(Import/Export)
Limit Lines	LLine_	(Import/Export)
Measurement Result	MeasR_	(Import/Export)
Capture Buffer	CapBuf_	(Import/Export)

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file.The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as “fred.csv”, then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

.

NOTE If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

Key Path	Front-panel key
Notes	No remote command for this key specifically.
Initial S/W Revision	Prior to A.02.00

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are States andTraces. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

NOTE In products that run multiple instances of the X-Series Application, all instances share the same register and file location where you want to recall from.

The default paths for Recall are data type dependent and are the same as for the Save key.

Key Path	Front-panel key
Notes	No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATe <filename>. If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.
Backwards Compatibility Notes	In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data. In the X-Series, “state” always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.
Backwards Compatibility Notes	Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn’t support and it will limit the recalled setting to what it allows. Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can’t be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible. It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user. Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.
Initial S/W Revision	Prior to A.02.00

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or "Recalled State Register <register number>" is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See "More Information" on page 506.

Key Path	Recall
Mode	All
Remote Command	`:MMEMory:LOAD:STATe <filename>`
Example	:MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path
Example	MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state.
Notes	When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled. • If there is a mismatch between file version or model number or instrument version or model number, the recall functiontries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number. After recalling the state, the Recall State function does the following: • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0.

	• Executes a *CLS If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu.
Backwards Compatibility SCPI	`:MMEMory:LOAD:STATe 1,<filename>` For backwards compatibility, the above syntax is supported. The "1" is simply ignored.
Initial S/W Revision	Prior to A.02.00

More Information

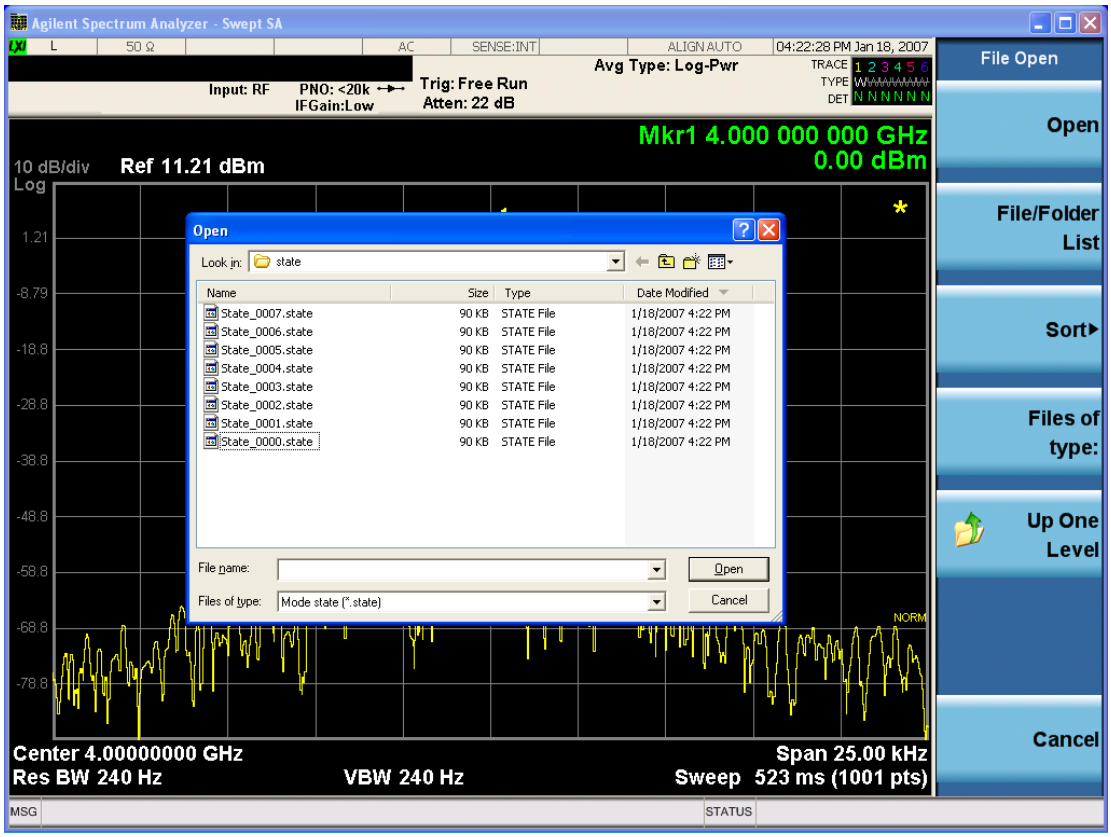
In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible,and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

The following table describes the Trace Save and Recall possibilities:

You want to recall state and one trace's data, leaving other traces unaffected.	Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed.	On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed.
You want to recall all traces	Save Trace+State from ALL traces.	On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved)
You want all traces to load exactly as they were when saved.	Save State	On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating willhave their data immediately overwritten.

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The Look In field first uses the last path from the Save As dialog Save In: path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current Open request to be cancelled. The ESC key does the same thing.

Key Path	Recall, State
Notes	Brings up the Open dialog for recalling a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

Key Path	Recall, State
Mode	All
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221,"Settings conflict;Option not available"
Initial S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

NOTE In products that run multiple instances of the X-Series Application, recalling the same register name on each instance is a way to share setups between the instances.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)" if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

NOTE In products that run multiple instances of the X-Series Application, recalling the same register name on each instance is a way to share setups between the instances.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)" if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Sequences

These keys allow you to import a Tab separated or .txt file that will automatically setup all the parameters required for building a Sequence. The parameters will automatically be loaded into the Stated Sequencer.

Once selected, in order to import the selected Sequence Type you must select the Open key in the Source Sequence menu.

Key Path	Recall, Sequences
Mode	All
Remote Command	`:MMEMory:LOAD:SEQuences: | SLISt | ALISt | SAAList | "MySequence.txt"`
Example	:MMEM:LOAD:SEQ:SLIS "MySequence.txt"
Notes	Available file types are: –CSV (Comma delimited) (*.csv) –Text (Tab delimited) (*.txt)
Initial S/W Revision	A.05.00

Source Sequence

The list of parameters, that configure steps, that makes up a sequence for the Source.

The Source sequence is a sequence of flexible configurable steps that can be set anywhere in the instruments frequency range.

Key Path	Recall,Sequences

Example	:MMEM:LOAD:SEQ:SLIS "MySequence.txt"
Dependencies	Only available in XOBT
Initial S/W Revision	A.05.00

Open...

When you press “Open”, the analyzer brings up a Windows dialog and a menu entitled “File Open.” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "From File..." on page 748in Recall, State, for a full description of this dialog and menu.

Key Path	Recall, Data
Notes	The key location is mode-dependent and will vary. Brings up Open dialog for recalling a <mode specific> Save Type
Initial S/W Revision	Prior to A.02.00

Open...

When you press “Open”, the analyzer brings up a Windows dialog and a menu entitled “File Open.” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "From File..." on page 748in Recall, State, for a full description of this dialog and menu.

Key Path	Recall, Data
Notes	The key location is mode-dependent and will vary. Brings up Open dialog for recalling a <mode specific> Save Type
Initial S/W Revision	Prior to A.02.00

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMediate
- Sending the remote command INIT:RESTart

See "More Information" on page 512

Key Path	Front-panel key
Remote Command	`:INITiate[:IMMediate]` `:INITiate:RESTart`
Example	:INIT:IMM :INIT:REST
Notes	:INITiate:RESTart and :INITiate:IMMediate perform exactly the same function.
Couplings	Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement.
Status Bits/OPC dependencies	This is an Overlapped command. The STATus:OPERation register bits 0 through 8 are cleared. The STATus:QUEStionable register bit 9 (INTegrity sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set.
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTart command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTart command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTart command restart every measurement, which includes all traces and numeric results. There is no change to this operation.
Initial S/W Revision	Prior to A.02.00

More Information

The Restart function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when Restart is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average**, **Max Hold**, or **Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are States, Traces, and Screen Images. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

Key Path	Front-panel key
Mode	All
Notes	No remote command for this key specifically, but the :MMEM:STORe command is available for specific file types. An example is :MMEM:STOR:STATe <filename>.
Initial S/W Revision	Prior to A.02.00

State

The Save State menu lets you choose a register or file for saving the state.

NOTE In products that run multiple instances of the X-Series Application, all instances share the same register and file location where you want to save the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<mode name>\state

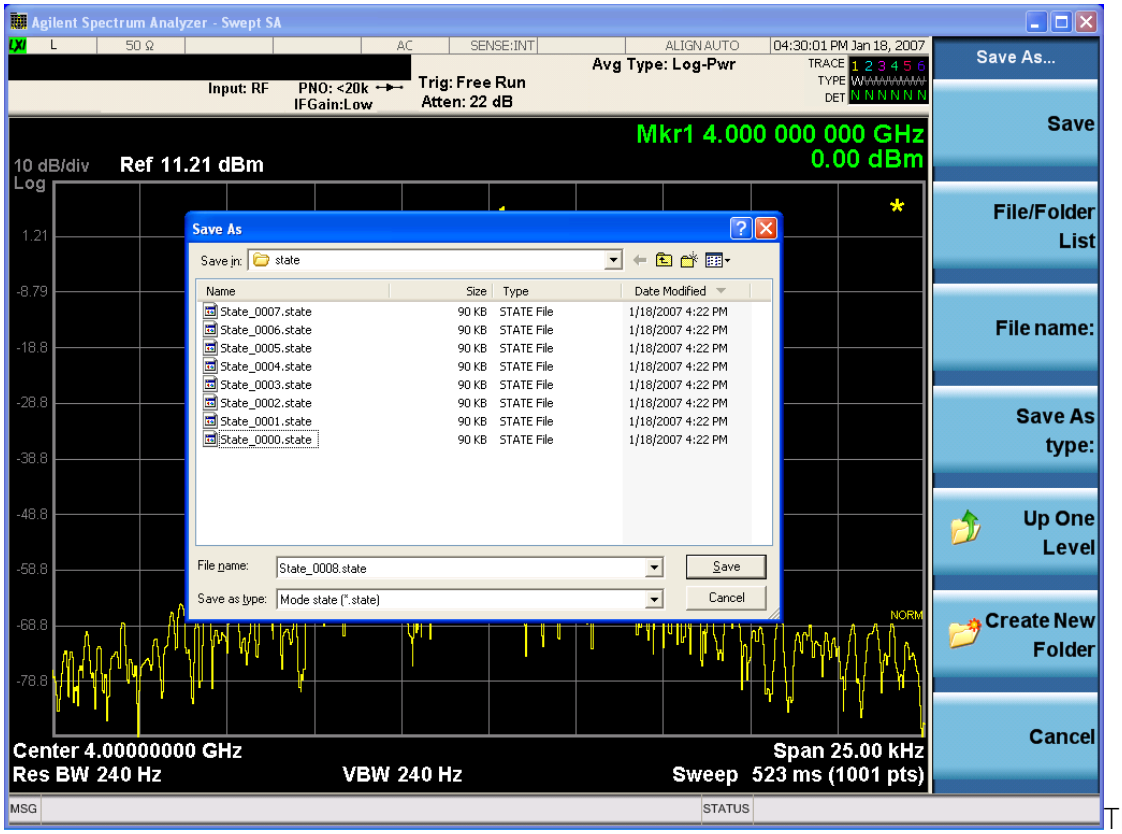
where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save
Mode	All
Remote Command	`:MMEMory:STORe:STATe <filename>`
Example	MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory.
Notes	Both single and double quotes are supported for any filename parameter over remote.

	After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.
Backwards Compatibility SCPI	`:MMEMory:STORe:STATe 1,<filename>` For backwards compatibility, the above syntax is supported. The "1" is simply ignored. The command is sequential.
Initial S/W Revision	Prior to A.02.00

To File . . .

When you press "To File", the analyzer brings up a Windows dialog and a menu entitled "Save As." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK,

the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The Save In field defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the "Quick Save " on page 744 documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor.Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the File Open dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name New Folder and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current Save As request to be cancelled. The ESC key does the same thing.

Key Path	Save, State
Mode	All
Notes	Brings up Save As dialog for saving a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See "More Information" on page 517

Key Path	Save, State
Mode	All
Remote Command	`:MMEMory:REGister:STATe:LABel <reg number>,"label"` `:MMEMory:REGister:STATe:LABel? <reg number>`
Example	:MMEM:REG:STAT:LAB 1,"my label"
Notes	<reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, –222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, –150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,""
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, –221,"Settings conflict;Option not available"
Preset	The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc"
Initial S/W Revision	A.11.00

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name.Another

consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

NOTE **In products that run multiple instances of the X-Series Application, save with different register name if you do not want to overwrite the register of another running instance.**

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)" if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at

what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

NOTE In products that run multiple instances of the X-Series Application, save with different register name if you do not want to overwrite the register of another running instance.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)" if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Mass Storage Catalog (Remote Command Only)

Key path	SCPI Only
Remote Command	`:MMEMory:CATalog? [<directory_name>]`
Notes	The string must be a valid logical path. Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format: <numeric_value>,<numeric_value>,{<file_entry>} It returns two numeric parameters and as many strings as there are files and directories. The first parameter indicates the total amount of storage currently used in bytes. The second parameter indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_ entry> indicates the name, type, and size of one file in the directory list: <file_name>,<file_type>,<file_size> As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty
Initial S/W Revision	Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	`:MMEMory:CDIRectory [<directory_name>]` `:MMEMory:CDIRectory?`
Notes	The string must be a valid logical path. Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value. At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal. Query returns full path of the default directory.
Initial S/W Revision	Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Key path	SCPI Only
Remote Command	`:MMEMory:COPY <string>,<string>[,<string>,<string>]`
Notes	The string must be a valid logical path. Copies an existing file to a new file or an existing directory to a new directory. Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination. The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists. This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

Key path	SCPI Only
Remote Command	`:MMEMory:COPY:DEVice <source_string>,<dest_string>`
Notes	The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device. Valid device keywords are: SNS (smart noise source) An error is generated if the file or device is not found.

Mass Storage Delete (Remote Command Only)

Key path	SCPI Only
Remote Command	`:MMEMory:DELete <file_name>[,<directory_name>]`
Notes	The string must be a valid logical path. Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an "access denied" error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

Key path	SCPI Only
Remote Command	`:MMEMory:DATA <file_name>, <data>` `:MMEMory:DATA? <file_name>`
Notes	The string must be a valid logical path. The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data. The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format.
Initial S/W Revision	Prior to A.02.00

Mass Storage Make Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	`:MMEMory:MDIRectory <directory_name>`
Notes	The string must be a valid logical path. Creates a new directory. The <directory_name> parameter specifies the name to be created. This command will generate an "access denied" error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Move (Remote Command Only)

Key path	SCPI Only
Remote Command	`:MMEMory:MOVE <string>,<string>[,<string>,<string>]`
Notes	The string must be a valid logical path. Moves an existing file to a new file or an existing directory to a new directory.

	Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination. The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists. This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Remove Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	`:MMEMory:RDIRectory <directory_name>`
Notes	The string must be a valid logical path. Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed. This command will generate an "access denied" error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Sequences

These keys allow you to save a Tab separated or CSV file of the setup parameters required to build a Sequence.

In order to save you must select the Save As button and choose a destination folder.

Key Path	Save, Sequences
Mode	All
Remote Command	`:MMEM:STOR:SEQuences: | SLISt | ALISt | SAAList | SSTep "MySequence.txt"`
Example	:MMEM:STOR:SEQ:SLISt "MySequence.txt"
Notes	Available file types are: –CSV (Comma delimited) (*.csv) –Text (Tab delimited) (*.txt)
Initial S/W Revision	A.05.00

Source Sequence

The list of parameters, that configure steps, that makes up a sequence for the Source.

The Source sequence is a sequence of flexible configurable steps that can be set anywhere in the instruments frequency range.

Key Path	Save, Sequences
Example	:MMEM:STOR:SEQ:SLIS "MySequence.txt"
Dependencies	Only available in XOBT
Initial S/W Revision	A.05.00

Save As . . .

This menu lets you select the location where you can save the Sequence. This menu is a standard Windows® dialog with Save As menu keys. The "File Name" field in the Save As dialog is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name softkey. See the Quick Save key documentation for more on the automatic file naming algorithm.

The default path for all Sequence Files is:

My Documents\Sequences

Key Path	Save, Sequences
Mode	All
Notes	Brings up Save As dialog for saving a Sequence Save Type
Initial S/W Revision	A.05.00

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows youto export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

Key Path	Save
Mode	All

Notes	The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands.
Dependencies	If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it.
Preset	Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults
Readback	The data type that is currently selected
Initial S/W Revision	Prior to A.02.00

Save As . . .

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.”** This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "To File . . ." on page 757 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\<mode name>\data\traces

For all of the Limit Data Files:

My Documents\<mode name>\data\limits

For all of the Measurement Results Data Files:

My Documents\<mode name>\data\<measurement name>\results

For all of the Capture Buffer Data Files:

My Documents\<mode name>\data\captureBuffer

Key Path	Save, Data
Mode	All
Notes	The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <mode specific> Save Type. The save is performed immediately and does not wait until the measurement is complete.
Initial S/W Revision	Prior to A.02.00

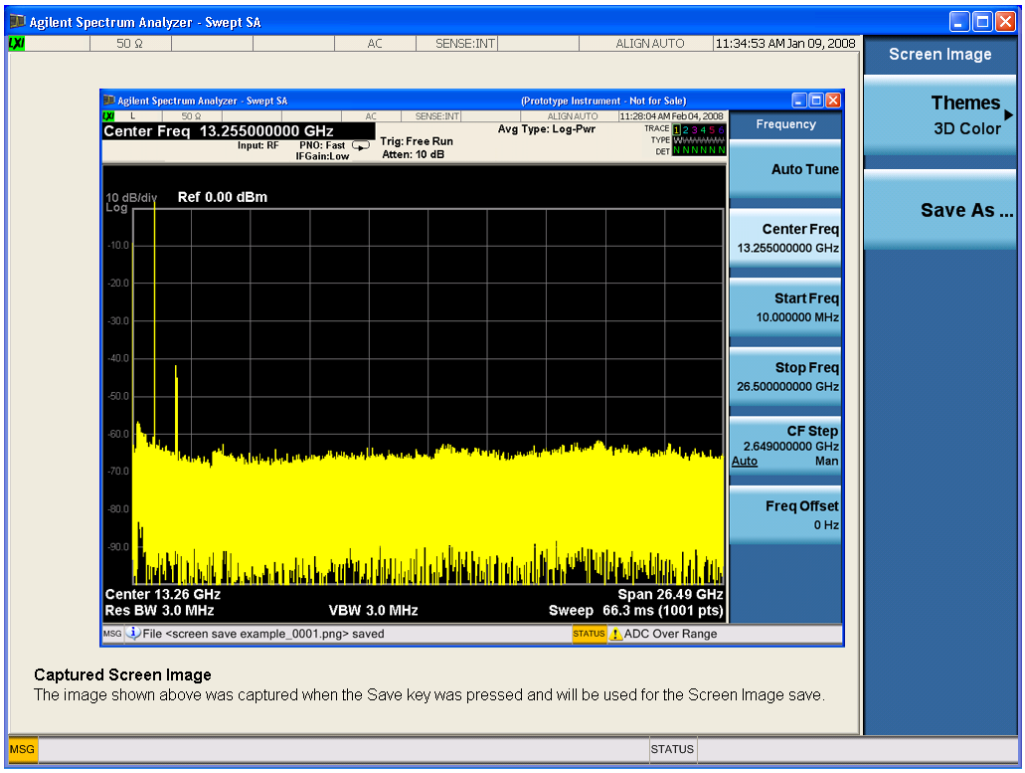
Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen

Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menus. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

Key Path	Save
Mode	All
Remote Command	`:MMEMory:STORe:SCReen <filename>`
Example	:MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The Themes option is the same as the Themes option under the Display and Page Setup dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	`:MMEMory:STORe:SCReen:THEMe TDColor | TDMonochrome | FCOLor | FMONochrome` `:MMEMory:STORe:SCReen:THEMe?`
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color | 3D Mono | Flat Color | Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Save As...

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “Save As.” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "To File . . ." on page 757 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\<mode name>\screen.

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save, Screen Image
Notes	Brings up Save As dialog for saving a Screen Image Save Type
Initial S/W Revision	Prior to A.02.00

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See "More Information" on page 528

Key Path	Front-panel key
Example	:INIT:CONT OFF
Notes	See Cont key description.
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold. For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state. INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORt. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.
Initial S/W Revision	Prior to A.02.00

More Information

See "Restart" on page 754 for details on the INIT:IMMediate (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMediate does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while Average/Hold Number is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

Opens a menu of keys that access various source configuration menus and settings. In the test set, pressing this key also causes the central view area to change and display the Source Control Main view.

Key Path	Front-panel key

RF Output

This parameter sets the source RF power output state.

Key Path	Source
Remote Command	`:OUTPut[:EXTernal][:STATe] ON|OFF|1|0` `:OUTPut[:EXTernal][:STATe]?`
Example	OUTP OFF OUTP?
Notes	The EXTernal node is shown in RD text so the SCPI remains the same between internal and external source control. However, for EXT we do not wish to document this node to the customer since we are controlling the internal source rather than the external source. This setting is for the independent mode and has no effect on the "List Sequencer" on page 850. If the "Sequencer" on page 851 is set to ON, the list sequencer controls the source output and this key will be grayed-out. And this setting will be none-forceful grey out on front panel to indicate out-of-scope. Non-forceful means user still can change this setting by SCPI but cannot change on front panel. When set to OFF will make source leave list sequencer and this setting will be black out and take effect immediately. When the RF Output is ON, an “RF” annunciator is displayed in the system settings panel. When the RF Output is turned Off, the RF annunciator is cleared. If the "Sequencer" on page 851 is set to ON, the “RF” annunciator will be replaced by “SEQ” in the system settings panel, indicating that the output is controlled by the list sequencer.
Preset	Off
Range	On | Off
Initial S/W Revision	A.05.00

Amplitude

Allows you to access the Amplitude sub-menu.

Key Path	Source
Notes	The sub-menu under this button is for independent mode and has no effect on "List Sequencer" on page 850. If the "Sequencer" on page 851 is set to ON, the list sequencer controls the source output and this key will be grayed-out on front panel to indicate out-of-scope. When you set "Sequencer" on page 851 to Off will make source leave list sequencer and this button will be black out.
Initial S/W Revision	A.05.00

RF Power

Allows you to adjust the power level of the source using the numeric keypad, step keys, or RPG. Pressing any digit, 0 through 9, on the numeric keypad brings up the unit terminator.

Please refer to the "RF Power Range " on page 531 table below for the valid ranges.

Key Path	Source, Amplitude
Remote Command	`:SOURce:POWer[:LEVel][:IMMediate][:AMPLitude] <ampl>` `:SOURce:POWer[:LEVel][:IMMediate][:AMPLitude]?`
Example	:SOUR:POW –100 dBm
Notes	Amplitude corrections can be specified for use with the source. In the event of amplitude corrections being applied, the valid ranges for the RF power do not change dependant on the current amplitude correction setting. If the combination of RF power + amplitude correction is higher or lower than the source output range, the Source Unleveled bit is set and the “Source Unleveled” indicator will appear on status panel to indicate that the source cannot maintain the output power that has been requested. When signal generator is unable to maintain the requested output level, the “Source Unleveled” indicator will appear on status panel. When the source output setting is restored to the normal range, the “Source Unleveled” is removed from status panel. Internal source has list sequence mode, which comprises of several steps which contain separate output power, frequency and waveform etc. When the source list sequence playing is complete, the last step keeps playing, and user can use this command to change the list sequence last step’s output power. The multiport adapter RFIO TX ports and GPS ports cannot ensure power accuracy when power setting is lower than –130dBm, this power setting value is defined by the sum of RF Power setting and related amplitude correction value. But user settable value could be lower than this limit. When application detected there exists power setting lower than –130dBm on MPA RFIO TX ports, then popup warning message . When application detected there exists power setting lower than –130dBm on MPA GPS ports, then popup warning message . This is only warning message, and check is performed when RF is ON.
Notes	The Min and Max value here defined UI settable amplitude range. This range is larger than actual amplitude range with level accuracy defined in spec.
Dependencies	The RF power is dependent on the RF output port and frequency, such that the current frequency and selected output port determine the valid range of power values.
Preset	–100 dBm
Min	The range of values depends on the current frequency and selected RF output port. Please refer to the "RF Power Range " on page 531 table below for the valid ranges.
Max	The range of values depends on the current frequency and selected RF output port. Please refer to the "RF Power Range " on page 531 table below for the valid ranges.
Initial S/W Revision	A.05.00

RF Power Range

RF Output Port	Frequency Range	Min Output Power	Max Output Power
High Power RF Out	10 MHz ≤ f ≤ 6 GHz	–150 dBm	20 dBm
RFIO 1 & RFIO 2	10 MHz ≤ f ≤ 6 GHz	–150 dBm	0 dBm
GPS (Note2)	10 MHz ≤ f ≤ 6 GHz	–150 dBm	0 dBm

Note: This is the UI power range, it's larger than actual spec.

Note2: GPS port is on the multiport adapter, or E6607C which has embedded MPA.

Set Reference Power

This key allows you to set the power reference. Pressing this key turns the power reference state to ON, sets the reference power value to the current RF output power, maintains this power at the RF output, and sets the displayed power to 0.00 dB. All subsequent RF power values entered under Source>Amplitude>RF Power are interpreted as being relative to this reference power.

When you use a power reference, the signal generator outputs an RF power that is set relative to the reference power by the value entered under Source>Amplitude>RF Power as follows:

Output power = reference power – entered power

Where:

reference power equals the original RF Power entered under Source>Amplitude>RF Power and set as the reference power

entered power equals a new value entered under Source>Amplitude>Amptd Offset

In addition, the displayed power value is the same as a new value entered under Source>Amplitude>RF Power.

NOTE If Power Ref is set to ON with a reference value set, entering a value under Source>Amplitude>RF Power and pressing Set Reference Power will add that value to the existing Power Ref value.

If you wish to change the reference power value to a new value entered under Source>Amplitude>RF Power, first you must set Power Ref to OFF and then press Set Reference Power.

Key Path	Source, Amplitude
Dependencies	This key is unavailable, and is grayed out when the "List Sequencer" on page 850 is turned ON.
Initial S/W Revision	A.05.00

Power Ref

This key allows you to toggle the state of the power reference.

When you use a power reference, the signal generator outputs an RF power that is set relative to the reference power by the value entered under Source>Amplitude>RF Power as follows:

Output power = reference power + entered power

Where:

reference power equals the original RF Power entered under Source>Amplitude>RF Power and set as the reference power

entered power equals a new value entered under Source>Amplitude>Amptd Offset

For more information on Reference Frequency refer to "Set Reference Power " on page 773

Key Path	Source, Amplitude

Remote Command	`:SOURce:POWer:REFerence <ampl>`
	`:SOURce:POWer:REFerence?`
	`:SOURce:POWer:REFerence:STATe OFF|ON|0|1`
	`:SOURce:POWer:REFerence:STATe?`

Example	:SOUR:POW:REF 0.00 dBm :SOUR:POW:REF:STATe ON
Dependencies	This setting is unavailable and is grayed out when the "List Sequencer" on page 850 is turned ON.
Couplings	This value is coupled to the "Set Reference Power " on page 773 key such that pressing the Set Reference Power key updates the reference power with the current output power.
Preset	0.00 dBm OFF
Min	–125.00 dBm
Max	10.00 dBm
Initial S/W Revision	A.05.00

Amptd Offset

Allows you to specify the RF output power offset value.

When the amplitude offset is set to zero (0) and you set a new offset value (positive or negative), the displayed amplitude value will change as follows and the RF output power will not change:

Displayed value = output power + offset value

Where:

output power equals the original RF Power entered under Source>Amplitude>RF Power

offset value equals the value entered under Source>Amplitude>Amptd Offset

When the amplitude offset is set to a value other than zero (0) and you enter a new RF power value under Source>Amplitude>RF Power, the displayed power will be the same as the value entered and the RF output power will be equal to the value entered minus the offset value as follows:

Output power = entered power – offset power

Displayed Power = output power + offset power

Displayed power = entered power

Where:

entered power equals the amplitude entered under Source>Amplitude>RF Power

offset power equals the value previously entered and set under Source>Amplitude>Amptd Offset

Key Path	Source, Amplitude
Remote Command	`:SOURce:POWer[:LEVel][:IMMediate]:OFFSet <rel_ampl>` `:SOURce:POWer[:LEVel][:IMMediate]:OFFSet?`
Example	:SOUR:POW:OFFS 0.00 dB
Dependencies	This setting is unavailable, and is grayed out when the List Sequencer is turned ON.
Preset	0.00 dB
Min	–200.00 dB
Max	200.00 dB
Initial S/W Revision	A.05.00

Modulation

Allows you to toggle the state of the modulation.

Key Path	Source
Remote Command	`:OUTPut:MODulation[:STATe] ON|OFF|1|0` `:OUTPut:MODulation[:STATe]?`
Example	:OUTP:MOD OFF
Notes	This setting is for independent mode and has no effect on "List Sequencer" on page 850. If the "Sequencer" on page 851 is set to ON, the list sequencer controls the source output and this key will be grayed-out. And this setting will be none-forceful grey out on front panel to indicate out-of-scope. Non-forceful means user still can change this setting by SCPI but cannot change manually on front panel. When setto Off will make source leave list sequencer and this setting will be black out and take effect immediately When the Modulation is ON, the “MOD” annunciator is displayed in the system settings panel. When the Modulation is turned Off, the “MOD” annunciator is cleared. If the "Sequencer" on page 851 is set to ON, the “MOD” annunciator will be replaced by “SEQ” in the system settings panel indicating that the output is controlled by list sequencer.
Preset	Off
Range	On | Off
Initial S/W Revision	A.05.00

Frequency

Allows you to access the Frequency sub-menu.

Key Path	Source
Notes	The sub-menu under this button is for independent mode and has no effect on "List Sequencer" on

	page 850. If the "Sequencer" on page 851 is set to ON, the list sequencer controls the source output and this key will be grayed-out. And this button will be grey out on front panel to indicate out-of-scope. When setto Off will make source leave list sequencer and this button will be black out.
Initial S/W Revision	A.05.00

Frequency

Allows you to set the RF Output Frequency. You can adjust the frequency of the source using the numeric keypad, step keys, or RPG. Pressing any digit, 0 through 9, on the numeric keypad brings up the unit terminator.

Key Path	Source, Frequency
Remote Command	`:SOURce:FREQuency[:CW] <freq>` `:SOURce:FREQuency[:CW]?`
Example	:SOUR:FREQ 1.00 GHz
Notes	Internal source has list sequence mode, which comprises of several steps which contain separate output power, frequency and waveform etc. When the source list sequence playing is complete, the last step keeps playing, and user can use this command to change the list sequence last step's output frequency.
Couplings	The frequency value is coupled to the current channel band and number, such that updates to the band and number will update the frequency value to the corresponding absolute frequency.
Preset	1.00 GHz If license F1A or 5WC is present, the default Center Frequency should be 2.412GHz.
Min	10.00 MHz
Max	Hardware Dependant: Option 503 = 3.6 GHz Option 504 = 3.8 GHz Option 506 = 6.00 GHz For E6640A, if license 5WC is present,the frequency range should be limited to: 1.1GHz–1.7GHz, 2.4GHz–2.5GHz, 4.8GHz–6.0GHz. If the user-defined frequency is outside of range, UI will report an error message called "Settings conflict; Frequency is outside available range".
Initial S/W Revision	A.05.00

Channel

The frequency of the source can be specified by a channel number of a given frequency band. This key allows you to specify the current channel number. For the appropriate range of channel numbers for a given frequency band, refer to the following tables: "GSM/EDGE Channel Number Ranges" on page 535, "W-CDMA Channel Number Ranges" on page 536, "CDMA 2000 / 1xEVDO Channel Number Ranges" on page 537, and "LTE FDD Channel Number Ranges" on page 539.

Key Path	Source, Frequency
Remote Command	`:SOURce:FREQuency:CHANnels:NUMBer <int>` `:SOURce:FREQuency:CHANnels:NUMBer?`
Example	:SOUR:FREQ:CHAN:NUMB 1
Notes	This key is grayed out when the "Radio Standard" on page 785 is set to NONE. This key is grayed out on E6630A.
Dependencies	This key is grayed out when the "Radio Standard" on page 785 is set to NONE. This key is grayed out on E6630A.
Couplings	The channel number is coupled to the frequency value when the "Radio Standard" on page 785 is not set to NONE. When the frequency value is changed, the channel number will increase or decrease to match the new frequency. If the frequency is not at an exact match for a channel number, the nearest channel number is displayed along with a greater than or less than sign to indicate the frequency is above or below the channel number.
Preset	1
Min	Please refer to the tables below for the valid ranges.
Max	Please refer to the tables below for the valid ranges.
Initial S/W Revision	A.05.00

GSM/EDGE Channel Number Ranges

Band	Link (Device)	Range	Frequency (MHz)
P-GSM	Uplink (MS)	$1 \le n \le 124$	890.0 + 0.2*n
	Downlink (BS)	$1 \le n \le 124$	935.0 + 0.2*n
E-GSM	Uplink (MS)	$0 \le n \le 124$	890.0 + 0.2*n
		$975 \le n \le 1023$	890.0 + 0.2*(n–1024)
	Downlink (BS)	$0 \le n \le 124$	935.0 + 0.2*n
		$975 \le n \le 1023$	935.0 + 0.2*(n–1024)
DCS 1800	Uplink (MS)	$512 \le n \le 885$	1710.200 + 0.20*(n–512)
	Downlink (BS)	$512 \le n \le 885$	1805.200 + 0.20*(n–512)
PCS 1900	Uplink (MS)	$512 \le n \le 810$	1850.200 + 0.2*(n–512)
	Downlink (BS)	$512 \le n \le 810$	1930.200 + 0.2*(n–512)
R-GSM	Uplink (MS)	$0 \le n \le 124$	890.0 + 0.2*n
		$955 \le n \le 1023$	890.0 + 0.2*(n–1024)
	Downlink (BS)	$0 \le n \le 124$	935.0 + 0.2*n
		$955 \le n \le 1023$	935.0 + 0.2*(n–1024)
GSM 450	Uplink (MS)	$256 \le n \le 293$	450.6 + 0.2*(n–259)
	Downlink (BS)	$256 \le n \le 293$	460.6 + 0.2*(n–259)
GSM 480	Uplink (MS)	$306 \le n \le 340$	479.000 + 0.20*(n–306)

Band	Link (Device)	Range	Frequency (MHz)
	Downlink (BS)	306 ≤ n ≤ 340	489.000 + 0.20*(n–306)
GSM 850	Uplink (MS)	128 ≤ n ≤ 251	824.200 + 0.20*(n–128)
	Downlink (BS)	128 ≤ n ≤ 251	869.200 + 0.20*(n–128)
GSM 700	Uplink (MS)	438 ≤ n ≤ 516	777.200 + 0.20*(n–438)
	Downlink (BS)	438 ≤ n ≤ 516	747.200 + 0.20*(n–438)
T-GSM810	Uplink (MS)	350 ≤ n ≤ 425	806.0 + 0.20*(n–350)
	Downlink (BS)	350 ≤ n ≤ 425	851.0 + 0.20*(n–350)

W-CDMA Channel Number Ranges

Band	Link (Device)	Range	Frequency (MHz)
Band I	Downlink	10562 ≤ n ≤ 10838	n÷5
	Uplink	9612 ≤ n ≤ 9888	n÷5
Band II	Downlink	412 ≤ n ≤ 687	n÷5 + 1850.1
		9662 ≤ n ≤ 9938	n÷5
	Uplink	12 ≤ n ≤ 287	n÷5 + 1850.1
		350 ≤ n ≤ 425	n÷5
Band III	Downlink	1162 ≤ n ≤ 1513	n÷5 + 1575
	Uplink	937 ≤ n ≤ 1288	n÷5 + 1525
Band IV	Downlink	537 ≤ n ≤ 1738	n÷5 + 1805
		1887 ≤ n ≤ 2087	n÷5 + 1735.1
	Uplink	1312 ≤ n ≤ 1513	n÷5 + 1450
		1662 ≤ n ≤ 1862	n÷5 + 1380.1
Band V	Downlink	1007 ≤ n ≤ 1087	n÷5 + 670.1
		4357 ≤ n ≤ 4458	n÷5
	Uplink	782 ≤ n ≤ 862	n÷5 + 670.1
		4132 ≤ n ≤ 4233	n÷5
Band VI	Downlink	1037 ≤ n ≤ 1062	n÷5 + 670.1
		4387 ≤ n ≤ 4413	n÷5
	Uplink	812 ≤ n ≤ 837	n÷5 + 670.1
		4162 ≤ n ≤ 4188	n÷5
Band VII	Downlink	2237 ≤ n ≤ 2563	n÷5 + 2175
		2587 ≤ n ≤ 2912	n÷5 + 2105.1
	Uplink	2012 ≤ n ≤ 2338	n÷5 + 2100
		2362 ≤ n ≤ 2687	n÷5 + 2030.1
Band VIII	Downlink	2937 ≤ n ≤ 3088	n÷5 + 340
	Uplink	2712 ≤ n ≤ 2863	n÷5 + 340

Band	Link (Device)	Range	Frequency (MHz)
Band IX	Downlink	9237 ≤ n ≤ 9387	n÷5
	Uplink	8762 ≤ n ≤ 8912	n÷5
Band X	Downlink	3112 ≤ n ≤ 3388	n÷5 + 1490
		3412 ≤ n ≤ 3687	n÷5 + 1430.1
	Uplink	2887 ≤ n ≤ 3163	n÷5 + 1135
		3187 ≤ n ≤ 3462	n÷5 + 1075.1
Band XI	Downlink	3712 ≤ n ≤ 3812	n÷5 + 736
	Uplink	3487 ≤ n ≤ 3587	n÷5 + 733
Band XII	Downlink	3837 ≤ n ≤ 3903	n÷5 – 37
		3927 ≤ n ≤ 3992	n÷5 – 54.9
	Uplink	3612 ≤ n ≤ 3678	n÷5 – 22
		3702 ≤ n ≤ 3767	n÷5 – 39.9
Band XIII	Downlink	4017 ≤ n ≤ 4043	n÷5 – 55
		4067 ≤ n ≤ 4092	n÷5 – 64.9
	Uplink	3792 ≤ n ≤ 3818	n÷5 + 21
		3702 ≤ n ≤ 3767	n÷5 – 39.9
Band XIV	Downlink	4117 ≤ n ≤ 4143	n÷5 – 63
		4167 ≤ n ≤ 4192	n÷5 – 72.9
	Uplink	3892 ≤ n ≤ 3918	n÷5 + 12
		3942 ≤ n ≤ 3967	n÷5 + 2.1
Band XIX	Downlink	712 ≤ n ≤ 763	n÷5 + 735
		787 ≤ n ≤ 837	n÷5 + 720.1
	Uplink	312 ≤ n ≤ 363	n÷5 + 770
		387 ≤ n ≤ 437	n÷5 + 755.1

CDMA 2000 / 1xEVDO Channel Number Ranges

Band	Link (Device)	Range	Frequency (MHz)
US Cellular	Uplink (MS, reverse link)	1 ≤ N ≤ 799	0.030×N+ 825.000
		991 ≤ N ≤ 1023	0.030× (N–1023) + 825.000
		1024 ≤ N ≤ 1323	0.030× (N–1024) + 815.040
	Downlink (BS, forward link)	1 ≤ N ≤ 799	0.030*N+ 870.000
		991 ≤ N ≤ 1023	0.030×(N–1023) + 870.000
		1024 ≤ N ≤ 1323	0.030×(N–1024) + 860.040
US PCS	Uplink (MS, reverse link)	0 ≤ N ≤ 1199	1850.000 + 0.050×N
	Downlink (BS, forward link)	0 ≤ N ≤ 1199	1930.000 + 0.050×N

Band	Link (Device)	Range	Frequency (MHz)
Japan Cellular Band	Uplink (MS, reverse link)	1 ≤ N ≤ 799	0.0125×(N+ 915.000
		801 ≤ N ≤ 1039	0.0125×(N–800)+ 898.000
		1041 ≤ N ≤ 1199	0.0125×(N–1040)+ 887.000
		1201 ≤ N ≤ 1600	0.0125×(N–1200)+ 893.000
	Downlink (BS, forward link)	1 ≤ N ≤ 799	0.0125×(N+ 860.000
		801 ≤ N ≤ 1039	0.0125×(N–800)+ 843.000
		1041 ≤ N ≤ 1199	0.0125×(N–1040)+ 832.000
		1201 ≤ N ≤ 1600	0.0125×(N–1200)+ 838.000
Korean PCS Band	Uplink (MS, reverse link)	0 ≤ N ≤ 599	0.050×N+ 1750.000
	Downlink (BS, forward link)	0 ≤ N ≤ 599	0.050×N+ 1840.000
NMT–450 Band	Uplink (MS, reverse link)	1 ≤ N ≤ 400	0.025×(N–1)+ 450.000
		472 ≤ N ≤ 871	0.025×(N–472)+ 410.000
		1039 ≤ N ≤ 1473	0.020×(N–1024)+ 451.010
		1536 ≤ N ≤ 1715	0.025×(N–1536)+ 479.000
		1792 ≤ N ≤ 2016	0.020×(N–1792)+ 479.000
	Downlink (BS, forward link)	1 ≤ N ≤ 400	0.025×(N–1)+ 460.000
		472 ≤ N ≤ 871	0.025×(N–472)+ 420.000
		1039 ≤ N ≤ 1473	0.020×(N–1024)+ 461.010
		1536 ≤ N ≤ 1715	0.025×(N–1536)+ 489.000
		1792 ≤ N ≤ 2016	0.020×(N–1792)+ 489.000
IMT–2000 Band	Uplink (MS, reverse link)	0 ≤ N ≤ 1199	1920.000 + 0.050×N
	Downlink (BS, forward link)	0 ≤ N ≤ 1199	2100.000 + 0.050×N
Upper 700 MHz Band	Uplink (MS, reverse link)	0 ≤ N ≤ 240	776.000 + 0.050×N
	Downlink (BS, forward link)	0 ≤ N ≤ 240	746.000 + 0.050×N
Secondary 800 MHz Band	Uplink (MS, reverse link)	0 ≤ N ≤ 719	0.025×N+ 806.000
		720 ≤ N ≤ 919	0.025×(N–720) + 896.000
	Downlink (BS, forward link)	0 ≤ N ≤ 719	0.025×N+ 851.000
		720 ≤ N ≤ 919	0.025×(N–720) + 935.000
2.5 GHz IMT Extension	Uplink (MS, reverse link)	0 ≤ N ≤ 1399	2500.000 + 0.050×N
	Downlink (BS, forward link)	0 ≤ N ≤ 1399	2620.000 + 0.050×N
US PCS 1.9 GHz	Uplink (MS, reverse link)	0 ≤ N ≤ 1299	1850.000 + 0.050×N

Band	Link (Device)	Range	Frequency (MHz)
	Downlink (BS, forward link)	0 ≤ N ≤ 1299	1930.000 + 0.050×N
AWS	Uplink (MS, reverse link)	0 ≤ N ≤ 899	1710.000 + 0.050×N
	Downlink (BS, forward link)	0 ≤ N ≤ 899	2100.000 + 0.050×N
US 2.5 GHz	Uplink (MS, reverse link)	140 ≤ N ≤ 1459	2495.000 + 0.050×N
	Downlink (BS, forward link)	140 ≤ N ≤ 1459	2617.000 + 0.050×N
700 Public Safety	Uplink (MS, reverse link)	0 ≤ N ≤ 240	787.000 + 0.050×N
	Downlink (BS, forward link)	0 ≤ N ≤ 240	757.000 + 0.050×N
C2K Lower 700	Uplink (MS, reverse link)	0 ≤ N ≤ 360	698.000 + 0.050×N
	Downlink (BS, forward link)	0 ≤ N ≤ 360	728.000 + 0.050×N
400 Euro PAMR	Uplink (MS, reverse link) Uplink (MS, reverse link) Uplink (MS, reverse link)	1 ≤ N ≤ 400 472 ≤ N ≤ 871 1536 ≤ N ≤ 1715	0.025×(N–1)+ 450.000 0.025×(N–472)+ 410.000 0.025×(N–1536)+ 479.000
	Downlink (BS, forward link) Downlink (BS, forward link) Downlink (BS, forward link)	1 ≤ N ≤ 400 472 ≤ N ≤ 871 1536 ≤ N ≤ 1715	0.025×(N–1)+ 460.000 0.025×(N–472)+ 420.000 0.025×(N–1536)+ 489.000
800 PAMR	Uplink (MS, reverse link)	0 ≤ N ≤ 239	870.0125 + 0.025×N
	Downlink (BS, forward link)	0 ≤ N ≤ 239	915.0125 + 0.025×N

LTE FDD Channel Number Ranges

The carrier frequency in the uplink and downlink is designated by the E-UTRA Absolute Radio Frequency Channel Number (EARFCN) in the range 0 – 65535. The relation between EARFCN and the carrier frequency in MHz for the downlink is given by the following equation, where FDL_low and NOffs-DL are given in table 5.4.4–1 and NDL is the downlink EARFCN.

FDL = FDL_low + 0.1(NDL – NOffs-DL)

The relation between EARFCN and the carrier frequency in MHz for the uplink is given by the following equation where FUL_low and NOffs-UL are given in table 5.4.4–1 and NUL is the uplink EARFCN.

FUL = FUL_low + 0.1(NUL – NOffs-UL)

Band	**Downlink**	**Uplink**				
FDL_low (**MHz**)	**N**Offs-DL	**Range of N**DL	**F**UL_low (**MHz**)	**N**Offs-UL	**Range of N**UL	
1	2110	0	0 – 599	1920	18000	18000 – 18599
2	1930	600	600 – 1199	1850	18600	18600 – 19199
3	1805	1200	1200 – 1949	1710	19200	19200 – 19949
4	2110	1950	1950 – 2399	1710	19950	19950 – 20399
5	869	2400	2400 – 2649	824	20400	20400 – 20649
6	875	2650	2650 – 2749	830	20650	20650 – 20749
7	2620	2750	2750 – 3449	2500	20750	20750 – 20449
8	925	3450	3450 – 3799	880	21450	21450 – 21799
9	1844.9	3800	3800 – 4149	1749.9	21800	21800 – 22149
10	2110	4150	4150 – 4749	1710	22150	22150 – 22749
11	1475.9	4750	4750 – 4949	1427.9	22750	22750 – 22949
12	729	5010	5010 – 5179	699	23010	23010 – 23179
13	746	5180	5180 – 5279	777	23180	23180 – 23279
14	758	5280	5280 – 5379	788	23280	23280 – 23379
…						
17	734	5730	5730 – 5849	704	23730	23730 – 23849
18	860	5850	5850 – 5999	815	23850	23850 – 23999
19	875	6000	6000 – 6149	830	24000	24000 – 24149
20	791	6150	6150 – 6449	832	24150	24150 – 24449
21	1495.9	6450	6450 – 6599	1447.9	24450	24450 – 24599
…						
24	1525	7700	7700 – 8039	1626.5	25700	25700 – 26039
25	1930	8040	8040 – 8689	1850	26040	26040 – 26689
26	859	8690	8690 – 9039	814	26690	26690 – 27039
…						

Note: The channel numbers that designate carrier frequencies so close to the operating band edges that the carrier extends beyond the operating band edge shall not be used. This implies that the first 7, 15, 25, 50, 75 and 100 channel numbers at the lower operating band edge and the last 6, 14, 24, 49, 74 and 99 channel numbers at the upper operating band edge shall not be used for channel bandwidths of 1.4, 3, 5, 10, 15 and 20 MHz respectively.

LTE TDD Channel Number Ranges

The carrier frequency in the uplink and downlink is designated by the E-UTRA Absolute Radio Frequency Channel Number (EARFCN) in the range 0 – 65535. The relation between EARFCN and the carrier frequency in MHz for the downlink is given by the following equation, where FDL_low and NOffs-DL are given in table 5.4.4–1 and NDL is the downlink EARFCN.

FDL = FDL_low + 0.1(NDL – NOffs-DL)

The relation between EARFCN and the carrier frequency in MHz for the uplink is given by the following equation where FUL_low and NOffs-UL are given in table 5.4.4–1 and NUL is the uplink EARFCN.

FUL = FUL_low + 0.1(NUL – NOffs-UL)

Band	Downlink	Uplink				
FDL_low (MHz)	NOffs-DL	Range of NDL	FUL_low (MHz)	NOffs-UL	Range of NUL	
33	1900	36000	36000 –36199	1900	36000	36000 – 36199
34	2010	36200	36200 –36349	2010	36200	36200 – 36349
35	1850	36350	36350 –36949	1850	36350	36350 – 36949
36	1930	36950	36950 –37549	1930	36950	36950 – 37549
37	1910	37550	37550 –37749	1910	37550	37550 – 37749
38	2570	37750	37750 –38249	2570	37750	37750 – 38249
39	1880	38250	38250 –38649	1880	38250	38250 – 38649
40	2300	38650	38650 –39649	2300	38650	38650 – 39649
41	2496	39650	39650 – 41589	2496	39650	39650 – 41589
42	3400	41590	41590 – 43589	3400	41590	41590 – 43589
43	3600	43590	43590 – 45589	3600	43590	43590 – 45589

Note: The channel numbers that designate carrier frequencies so close to the operating band edges that the carrier extends beyond the operating band edge shall not be used. This implies that the first 7, 15, 25, 50, 75 and 100 channel numbers at the lower operating band edge and the last 6, 14, 24, 49, 74 and 99 channel numbers at the upper operating band edge shall not be used for channel bandwidths of 1.4, 3, 5, 10, 15 and 20 MHz respectively.

TDSCDMA Channel Number Ranges

1.28 Mcps TDD Option

No TX-RX frequency separation is required as Time Division Duplex (TDD) is employed. Each subframe consists of 7 main timeslots where all main timeslots (at least the first one) before the single switching point are allocated DL and all main timeslots (at least the last one) after the single switching point are allocated UL.

The nominal channel spacing is 1.6 MHz, but this can be adjusted to optimise performance in a particular deployment scenario.

The carrier frequency is designated by the UTRA absolute radio frequency channel number (UARFCN). The value of the UARFCN in the IMT2000 band is defined in the general case as follows:

Nt = 5*F 0.0 MHz ≤ F≤ 3276.6 MHz

where F is the carrier frequency in MHz

Additional channels applicable to operation in the frequency band defined in sub-clause 5.2(d) are defined via the following UARFCN definition:

Nt = 5 * (F – 2150.1 MHz)2572.5 MHz ≤ F≤ 2617.5 MHz

UARFCN

1.28 Mcps TDD Option

The following UARFCN range shall be supported for each band:

Table: UTRA Absolute Radio Frequency Channel Number 1.28 Mcps TDD Option

Frequency Band	Frequency Range	UARFCN Uplink and Downlink transmission
For operation in frequency band as defined in subclause 5.2 (a)	1900–1920 MHz	9504 to 9596
	2010–2025 MHz	10054 to 10121
For operation in frequency band as defined in subclause 5.2 (b)	1850–1910 MHz	9254 to 9546
	1930–1990 MHz	9654 to 9946
For operation in frequency band as defined in subclause 5.2 (c)	1910–1930 MHz	9554 to 9646
For operation in frequency band as defined in subclause 5.2 (d)	2570–2620 MHz	12854 to 13096
For operation in frequency band as defined in subclause 5.2 (e)	2300–2400 MHz	11504 to 11996
For operation in frequency band as defined in subclause 5.2 (f)	1880–1920 MHz	9404 to 9596

Radio Setup

Allows access to the sub-menus for selecting the radio standard and associated radio band. You can also set a frequency reference and offset.

This menu is greyed out when on E6630A. Radio band settings for GSM, cdma2000, and so on -- most of which are not actually supported in E6630A, which has three narrow frequency bands. So band settings are grayed out.

Key Path	Source, Frequency
Initial S/W Revision	A.05.00

Radio Standard

Allows access to the channel band sub-menus to select the desired radio standard. When you have selected the radio standard, you can then set an active channel band. The radio standard and the active channel band allow you to use channel numbers to set frequency automatically.

Key Path	Source, Frequency, Radio Setup
Remote Command	`:SOURce:FREQuency:CHANnels:BAND NONE | PGSM | EGSM | RGSM | DCS1800 | PCS1900 | TGSM810 | GSM450 | GSM480 | GSM700 | GSM850 | BANDI | BANDII | BANDIII | BANDIV | BANDV | BANDVI | BANDVII | BANDVIII | BANDIX | BANDX | BANDXI | BANDXII | BANDXIII | BANDXIV | BANDXIX | USCELL | USPCS | JAPAN | KOREAN | NMT | IMT2K | UPPER | SECOND | PAMR400 | PAMR800 | IMTEXT | PCS1DOT9G | AWS | US2DOT5G | PUBLIC | LOWER | BAND1 | BAND2 | BAND3 | BAND4 | BAND5 | BAND6 | BAND7 | BAND8 | BAND10 | BAND11 | BAND12 | BAND13 | BAND14 | BAND17 | BAND18 | BAND19 | BAND20 | BAND21 | BAND24 | BAND25 | BAND26 | BAND27 | BAND28 | BAND31 | BAND33 | BAND34 | BAND35 | BAND36 | BAND37 | BAND38 | BAND39 | BAND40 | BAND41 | BAND42 | BAND43 | BAND44 | BANDA | BANDB | BANDC | BANDD | BANDE | BANDF` `:SOURce:FREQuency:CHANnels:BAND?`
Example	:SOUR:FREQ:CHAN:BAND PGSM
Notes	Set this setting to “NONE” will grey out "Channel" on page 776 Channel
Initial S/W Revision	A.05.00

None

Selects no radio standard for use. When you have selected the radio standard to NONE, you cannot use channel numbers to set frequency automatically. You will need to set the frequency manually.

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.05.00

GSM/EDGE

Sets GSM/EDGE as the radio standard for use and accesses the GSM/EDGE specific channel band sub-menus.

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.05.00

P-GSM

Selects P-GSM as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND PGSM
Initial S/W Revision	A.05.00

E-GSM

Selects E-GSM as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND EGSM
Initial S/W Revision	A.05.00

R-GSM

Selects R-GSM as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND RGSM
Initial S/W Revision	A.05.00

DCS 1800

Selects DCS 1800 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND DCS1800
Initial S/W Revision	A.05.00

PCS 1900

Selects PCS 1900 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND PCS1900
Initial S/W Revision	A.05.00

GSM 450

Selects GSM 450 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND GSM450
Initial S/W Revision	A.05.00

GSM 480

Selects GSM 480 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND GSM480
Initial S/W Revision	A.05.00

GSM 850

Selects GSM 850 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND GSM850
Initial S/W Revision	A.05.00

GSM 700

Selects GSM 700 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND GSM700
Initial S/W Revision	A.05.00

T-GSM 810

Selects T-GSM 810 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND T-GSM810
Initial S/W Revision	A.05.00

WCDMA

Sets WCDMA as the radio standard for use and accesses the W-CDMA specific channel band sub-menus.

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.05.00

Band I

Selects Band I as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDI
Initial S/W Revision	A.05.00

Band II

Selects Band II as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDII
Initial S/W Revision	A.05.00

Band III

Selects Band III as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDIII
Initial S/W Revision	A.05.00

Band IV

Selects Band IV as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDIV
Initial S/W Revision	A.05.00

Band V

Selects Band V as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDV
Initial S/W Revision	A.05.00

Band VI

Selects Band VI as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDVI
Initial S/W Revision	A.05.00

Band VII

Selects Band VII as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDVII
Initial S/W Revision	A.05.00

Band VIII

Selects Band VIII as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDVIII
Initial S/W Revision	A.05.00

Band IX

Selects Band IX as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDIX
Initial S/W Revision	A.05.00

Band X

Selects Band X as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDX
Initial S/W Revision	A.05.00

Band XI

Selects Band XI as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDXI
Initial S/W Revision	A.05.00

Band XII

Selects Band XII as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDXII
Initial S/W Revision	A.05.00

Band XIII

Selects band XIII as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDXIII
Initial S/W Revision	A.05.00

Band XIV

Selects Band XIV as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDXIV
Initial S/W Revision	A.05.00

Band XIX

Selects Band XIX as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDXIX
Initial S/W Revision	A.14.50

CDMA 2000 / 1xEVDO

Sets CDMA 2000 / 1XEVDO as the radio standard for use and accesses the CDMA 2000/1xEVDO specific channel band sub-menus.

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.05.00

US CELL

Selects US Cell as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND USCELL
Initial S/W Revision	A.05.00

US PCS

Selects US PCS as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND PCS
Initial S/W Revision	A.05.00

Japan Cell

Selects Japan Cell as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND JAPAN
Initial S/W Revision	A.05.00

Korean PCS

Selects Korean PCS as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND KOREAN
Initial S/W Revision	A.05.00

NMT 450

Selects NMT 450 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO

Example	:SOUR:FREQ:CHAN:BAND NMT
Initial S/W Revision	A.05.00

IMT 2000

Selects IMT 2000 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND IMT2K
Initial S/W Revision	A.05.00

Upper 700

Selects Upper 700 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND UPPER
Initial S/W Revision	A.05.00

Secondary 800

Selects Secondary 800 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND SECOND
Initial S/W Revision	A.05.00

400 Euro PAMR

Selects 400 Euro PAMR as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND PAMR400
Initial S/W Revision	A.05.00

800 PAMR

Selects 800 PAMR as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO

Example	:SOUR:FREQ:CHAN:BAND PAMR800
Initial S/W Revision	A.05.00

2.5GHz IMT EXT

Selects 2.5 GHz IMT EXT as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND IMTEXT
Initial S/W Revision	A.05.00

US PCS 1.9GHz

Selects US PCS 1.9 GHz as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND PCS1DOT9G
Initial S/W Revision	A.05.00

AWS

Selects AWS as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND AWS
Initial S/W Revision	A.05.00

US 2.5GHz

Selects US 2.5 GHz as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND US2DOT5G
Initial S/W Revision	A.05.00

700 Public Safety

Selects 700 Public Safety as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO

Example	:SOUR:FREQ:CHAN:BAND PUBLIC
Initial S/W Revision	A.05.00

C2K Lower 700

Selects C2K Lower 700 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND LOWER
Initial S/W Revision	A.05.00

LTE

Sets LTE FDD as the radio standard for use and accesses the LTE FDD specific channel band sub-menus..

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.09.50

BAND 1

Selects BAND 1 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND1
Initial S/W Revision	A.09.50

BAND 2

Selects BAND 2 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND2
Initial S/W Revision	A.09.50

BAND 3

Selects BAND 3 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND3
Initial S/W Revision	A.09.50

BAND 4

Selects BAND 4 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND4
Initial S/W Revision	A.09.50

BAND 5

Selects BAND 5 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND5
Initial S/W Revision	A.09.50

BAND 6

Selects BAND 6 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND6
Initial S/W Revision	A.09.50

BAND 7

Selects BAND 7 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND7
Initial S/W Revision	A.09.50

BAND 8

Selects BAND 8 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND8
Initial S/W Revision	A.09.50

BAND 9

Selects BAND 9 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND9
Initial S/W Revision	A.09.50

BAND 10

Selects BAND 10 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND10
Initial S/W Revision	A.09.50

BAND 11

Selects BAND 11 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND11
Initial S/W Revision	A.09.50

BAND 12

Selects BAND 12 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND12
Initial S/W Revision	A.09.50

BAND 13

Selects BAND 13 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND13
Initial S/W Revision	A.09.50

BAND 14

Selects BAND 14 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND14
Initial S/W Revision	A.09.50

BAND 17

Selects BAND 17 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND17
Initial S/W Revision	A.09.50

BAND 18

Selects BAND 18 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND18
Initial S/W Revision	A.09.50

BAND 19

Selects BAND 19 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND19
Initial S/W Revision	A.09.50

BAND 20

Selects BAND 20 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND20
Initial S/W Revision	A.09.50

BAND 21

Selects BAND 21 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND21
Initial S/W Revision	A.09.50

BAND 24

Selects BAND 24 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND24
Initial S/W Revision	A.09.50

BAND 25

Selects BAND 25 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND25
Initial S/W Revision	A.09.50

BAND 26

Selects BAND 26 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND26
Initial S/W Revision	A.12.53

BAND 27

Selects BAND 27 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND27
Initial S/W Revision	A.14.00

BAND 28

Selects BAND 28 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND28
Initial S/W Revision	A.14.00

BAND 31

Selects BAND 31 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND31
Initial S/W Revision	A.14.00

LTE TDD

Sets LTE TDD as the radio standard for use and accesses the LTE TDD specific channel band sub-menus..

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.11.50

BAND 33

Selects BAND 33 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND33
Initial S/W Revision	A.11.50

BAND 34

Selects BAND 34 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND34
Initial S/W Revision	A.11.50

BAND 35

Selects BAND 35 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND35
Initial S/W Revision	A.11.50

BAND 36

Selects BAND 36 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND36
Initial S/W Revision	A.11.50

BAND 37

Selects BAND 37 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND37
Initial S/W Revision	A.11.50

BAND 38

Selects BAND 38 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND38
Initial S/W Revision	A.11.50

BAND 39

Selects BAND 39 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND39
Initial S/W Revision	A.11.50

BAND 40

Selects BAND 40 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND40
Initial S/W Revision	A.11.50

BAND 41

Selects BAND 41 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND41
Initial S/W Revision	A.11.50

BAND 42

Selects BAND 42 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND42
Initial S/W Revision	A.11.50

BAND 43

Selects BAND 43 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND43
Initial S/W Revision	A.11.50

BAND 44

Selects BAND 44 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND44
Initial S/W Revision	A.14.00

TDSCDMA

Sets TDSCDMA as the radio standard for use and accesses the TDSCDMA specific channel band sub-menus..

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.11.50

BAND A

Selects BAND A as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDA
Initial S/W Revision	A.11.50

BAND B

Selects BAND B as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDB
Initial S/W Revision	A.11.50

BAND C

Selects BAND C as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDC
Initial S/W Revision	A.11.50

BAND D

Selects BAND D as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDD
Initial S/W Revision	A.11.50

BAND E

Selects BAND E as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA

Example	:SOUR:FREQ:CHAN:BAND BANDE
Initial S/W Revision	A.11.50

BAND F

Selects BAND F as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDF
Initial S/W Revision	A.11.50

Radio Band Link

Allows you to specify the channel band type as either uplink or downlink link direction. This value is used in conjunction with the channel band and channel number to determine the absolute frequency output by the source. When set to “Uplink”, the source will calculate the uplink frequency using an uplink formula together with the selected channel band and channel number . When set to “Downlink”, the source will calculate the downlink frequency using a downlink formula together with the selected channel band and channel number.

Key Path	Source, Frequency, Radio Setup
Remote Command	`:SOURce:RADio:BAND:LINK DOWN|UP` `:SOURce:RADio:BAND:LINK?`
Example	:SOUR:RAD:BAND:LINK UP
Preset	DOWN
Range	DOWN | UP
Backwards Compatibility SCPI	`:SOURce:RADio:DEVice BTS|MS` `:SOURce:RADio:DEVice?`
Backwards Compatibility Notes	BTS maps to the Downlink frequency MS maps to the Uplink frequency
Initial S/W Revision	A.05.00

Set Reference Frequency

This key allows you to set the frequency reference. Pressing this key turns the frequency reference state to ON, sets the reference frequency value to the current frequency, maintains this frequency at the RF output, and sets the displayed frequency to 0.00 Hz. All subsequent frequencies entered under Source>Frequency>Frequency are interpreted as being relative to this reference frequency.

When you use a frequency reference, the signal generator outputs a frequency that is set relative to the reference frequency by the value entered under Source>Frequency>Frequency as follows:

Output frequency = reference frequency - entered frequency

Where:

reference frequency equals the original RF frequency entered under Source>Frequency>Frequency and set as the reference frequency

entered frequency equals a new value entered under Source>Frequency>Frequency

In addition, the displayed frequency value will be the same as the value entered under Source>Frequency>Frequency.

NOTE

If Freq Reference is set to ON with a reference value set, entering a value under Source>Frequency>Frequency and pressing Set Frequency Reference will add that value to the existing Freq Reference value.

If you wish to change the reference frequency value to the new value entered under Source>Frequency>Frequency, first you must set Freq Reference to OFF and then press Set Frequency Reference.

Key Path	Source, Frequency
Remote Command	`:SOURce:FREQuency:REFerence:SET`
Example	:SOUR:FREQ:REF:SET
Dependencies	This setting is unavailable, and is grayed out when the List Sequencer is turned ON.
Initial S/W Revision	A.05.00

Freq Reference

This key allows you to toggle the state of the frequency reference. When the frequency reference state is ON, an annunciator is displayed on the main source view to indicate this state to the user.

When you use a frequency reference, the signal generator outputs a frequency that is set relative to the reference frequency by the value entered under Source>Frequency>Frequency as follows:

Output frequency = reference frequency + entered frequency

Where:

reference frequency equals the original RF frequency entered under Source>Frequency>Frequency and set as the reference frequency

entered frequency equals a new value entered under Source>Frequency>Frequency

For more information on Reference Frequency refer to "Set Reference Frequency" on page 803

Key Path	Source, Frequency

Remote Command	`:SOURce:FREQuency:REFerence <freq>`
	`:SOURce:FREQuency:REFerence?`
	`:SOURce:FREQuency:REFerence:STATe OFF|ON|0|1`
	`:SOURce:FREQuency:REFerence:STATe?`

Example	:SOUR:FREQ:REF 0.00 Hz

	:SOUR:FREQ:REF:STATe ON
Dependencies	This setting is unavailable, and is grayed out when the List Sequencer is turned ON.
Couplings	The frequency reference state is coupled to the frequency reference set immediate action. When the reference set immediate action key is pressed, or the SCPI command issued, it turns the frequency reference state ON.
Preset	0.00 Hz OFF
Min	0.00 Hz
Max	Hardware Dependant: Option 503 = 3.6 GHz Option 504 = 3.8 GHz Option 506 = 6.00 GHz
Initial S/W Revision	A.05.00

Freq Offset

Allows you to specify the frequency offset value. When the frequency offset state is ON, an annunciator is displayed on the main source view to indicate this state to the user.

When the frequency offset is set to zero (0) and you set a new offset value, the displayed frequency value will change as follows and the RF output frequency will not change:

Displayed value = output frequency + offset value

Where:

output frequency equals the original frequency entered under Source>Frequency>Frequency

offset value equals the value entered under Source>Frequency>Freq Offset

When the frequency offset is set to a value other than zero (0) and you enter a new frequency value under Source>Frequency>Frequency, the displayed frequency will be the same as the value entered and the RF output frequency will be equal to the value entered minus the offset value as follows:

Output frequency = entered frequency – offset frequency

Displayed frequency = output frequency + offset frequency

Displayed frequency = entered frequency

Where:

entered frequency equals the frequency entered under Source>Frequency>Frequency

offset frequency equals the value previously entered and set under Source>Frequency>Freq Offset

Key Path	Source, Frequency
Remote Command	`:SOURce:FREQuency:OFFSet <freq>`

	:SOURce:FREQuency:OFFSet?
Example	:SOUR:FREQ:OFFS 0 Hz
Dependencies	This setting is unavailable, and is grayed out when the List Sequencer is turned ON.
Preset	0 Hz
Min	–100.00 GHz
Max	100.00 GHz
Initial S/W Revision	A.05.00

Modulation Setup

Allows access to the menus for setting up the available modulation types: "ARB" on page 806, "AM" on page 847, "FM" on page 848, and "PM" on page 849.

Key Path	Source
Initial S/W Revision	A.05.00

ARB

Allows you access to the ARB sub-menus.

Key Path	Source, Modulation Setup
Initial S/W Revision	A.05.00

ARB

Allows you to toggle the state of the ARB function. When the ARB is On, a “MOD” annunciator is displayed in the system settings panel. When the ARB is turned Off, the MOD annunciator is cleared

Key Path	Source, Modulation Setup, ARB
Remote Command	:SOURce:RADio:ARB[:STATe] ON|OFF|1|0 :SOURce:RADio:ARB[:STATe]?
Example	:SOUR:RAD:ARB OFF :SOUR:RAD:ARB?
Notes	If the ARB is ON, a user then loads or deletes another file to ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Dependencies	This setting is for independent mode and has no effect on 3.3.8 list sequencer mode. Setting "Sequencer" on page 851 Sequencer to On will put source enter list sequencer mode, and even if ARB state is On, the ARB file will not be played. Setting "Sequencer" on page 851 Sequencer to Off will make source leave list sequencer mode, and this setting will take effect immediately.

	The ARB can only be turned on when there is a waveform file selected for playback. On the GUI If no waveform is selected, this key is grayed out. If you send the SCPI command to turn the ARB on with no waveform selected for playback, the ARB state remains OFF and an error is generated. “- When you try to recall a certain set of states in which the selected waveform is not in ARB memory and the ARB state is On, errors are reported
Preset	Off
Range	On | Off
Initial S/W Revision	A.05.00

Select Waveform

Allows you to access to the waveform selection sub-menus.

Pressing this key changes the central view area to show the Waveform File Selection view.

Key Path	Source, Modulation Setup, ARB
Initial S/W Revision	A.05.00

Select Waveform

Allows you to select a waveform sequence or segment for the dual ARB to play.

NOTE: Selecting a waveform file does not result in automatic adjustments to burst timing (to compensate for the presence or absence of a Multiport Adapter); that adjustment occurs only when a waveform is loaded to ARB memory. See "Load Segment to ARB Memory" for more information about this adjustment.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Remote Command	`:SOURce:RADio:ARB:WAVeform <string>` `:SOURce:RADio:ARB:WAVeform?`
Example	:SOUR:RAD:ARB:WAV “test_waveform.bin”
Notes	If intended waveform is not in the memory yet, then issuing this command by SCPI will invoke ARB loading operation first, which involves a delay of unpredictable length. So this command should be followed by the query *OPC?, which holds off subsequent commands until the loading operating is complete. <string> - specifies the name of the waveform segment or waveform sequence to be played by the ARB. When in Sequence Analyzer mode, and Include Source is Yes, if the you attempt to play a waveform sequence but not all the required waveform segments are in the ARB playback memory, the application will reject the loading operation with an error is generated . When Include Source is No, if you attempt to play a waveform sequence but not all the required waveform segments are contained in the ARB playback memory, the application will attempt to load the required segments from either the default directory of the current directory. If the ARB memory does not have enough space for all the waveform segments to be loaded, an error is generated and

	none of the waveform segments is loaded. If the ARB is ON, and you attampt to play a waveform sequence but not all the waveform segments within the sequence could be found to be loaded into ARB memory, an error is generated. The selected waveform keeps the previous value and ARB state remains On. If you specify a waveform segment over SCPI but the waveform segment is not present within ARB playback memory and cannot be found for auto loading within the current directory or the default directory, an error is generatedand the file selection remains unchanged. If you select a waveform for playback and the waveform requires a license that is not installed on the instrument, an error is generated.error is generated. If the ARB is ON and you load a file to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Segments on Hard Disk

Allows you access to the sub-menus for loading waveform segments from the hard disk into ARB memory. The default directory is: D: varb.

Pressing this key changes the current view to the Waveform Management View.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Initial S/W Revision	A.05.00

Load Segment To ARB Memory

Allows you to load the selected file into ARB memory. On the front panel you select the file for loading to the ARB memory by highlighting the desired file in the list. Using the SCPI command, you specify the file name on the HDD.

“NVWFM” (none-volatile storage) MSUS (Mass Storage Unit Specifier) is supported in the memory subsystem because the ARB memory cannot be accessed directly. Therefore, files must be downloaded to the instrument hard disk and then loaded into the ARB memory. “NVWFM” MSUS will be mapped to the default directory D: VARB. The SCPI command supports using either “NVWFM” MSUS or specifying a full path. For more information, see Memory Subsystem (Remote Command Only).

If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MMEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk

Remote Command	`:SOURce:RADio:ARB:LOAD <string>`
Example	:SOUR:RAD:ARB:LOAD “D: VARB\testwaveform.bin” or :SOUR:RAD:ARB:LOAD “NVWFM:testwaveform.bin”
Notes	Because loading the file involves a delay of unpredictable length, this command should be followed by the query *OPC?, which holds off subsequent commands until the loading operating is complete. <string> – specifies the path name of the file to load from the HDD into ARB memory. It could be a <full path + filename>, or <“NVWFM” MSUS + colon + filename>. When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load a file to ARB memory will be rejected with an error. When Include Source is Noand if there is insufficient free ARB memory to load the selected waveform, an error is generated. . If you specify a file over SCPI, but the file is not at the specified location, an error is generated. If you try to load a waveform file but the file contains less than 500 IQ sampes, an error is generated. If you try to load a Signal Studio waveform “*.wfm” which contains invalid waveform header, an error is generated. If the ARB is ON when you load afile to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished. ARB can be loaded into ARB memory even required licenses do not present on the instrument. In this case, a GUI only warning message –800, “Operation complete; Loaded <filename> successfully, but no license <required licenses> installed”. User can install required licenses according to <required licenses> string to license it, or multi-pack license it.
Initial S/W Revision	A.05.00

Load All To ARB Memory

Allows you to load all the segment files within the currently selected directory into ARB memory. If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:LOAD:ALL <string>`
Example	:SOUR:RAD:ARB:LOAD:ALL “D: varb”
Notes	<string> - specifies the directory on the HDD to load the files into ARB memory from. When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load all files from a directory to ARB memory is rejected with an error. When Include Source is No and there is insufficient free ARB memory to load all the waveforms,

	when the ARB memory is full, the copy ceases, and an error is generated. If you specify a directory over SCPI, but the directory does not exist, an error is generated. If the ARB is ON, a user then loads or deletes file to ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Change Directory...

Allows you to change the currently selected directory on the hard disk. Pressing this key opens a standard windows change directory dialog allowing you to select the new directory of interest.

The current directory is used for manually loading waveform segments into ARB memory for playback, and as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence or a list sequence.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Notes	No remote command, SCPIfront panel only.
Initial S/W Revision	A.05.00

Default Directory...

Allows you to change the default directory. It is used as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence, and as a search location for selecting waveforms using SCPI.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:DEFault:DIRectory <string>` `:SOURce:RADio:ARB: DEFault:DIRectory?`
Example	:SOUR:RAD:ARB:DEF:DIR “D:\ArbFiles” :SOUR:RAD:ARB:DEF:DIR?
State Saved	Persistent, survives a power cycle and a preset but not saved in the instrument state
Initial S/W Revision	A.05.00

Segments in ARB Memory

Allows you access to the sub-menus for managing the files within ARB memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Initial S/W Revision	A.05.00

Delete Segment From ARB Mem

Allows you to remove a segment from ARB playback memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments in ARB Memory
Remote Command	`:SOURce:RADio:ARB:DELete <string>`
Example	:SOUR:RAD:ARB:DEL “testwaveform.bin”
Notes	<string> - specifies the waveform to be deleted from the ARB playback memory. When in Sequence Analyzer mode and Include Source is Yes, an attempt to delete a file from ARB memory is rejected with an error. When Include Source is No and you specify a file that does not exist within ARB memory, an error is generated. It is possible to delete files from within the ARB memory when the ARB is ON. However, if you attempt to delete the file that is currently playing an error is generated. It is possible to delete a file from within the ARB memory when the sequencer state is ON and the file is not being used by the List Sequencer. If you attempt to delete a file which is being used by the list sequencer, an error is generated. When sequencer state is On, even if ARB state is On, the selected waveform will not be played. In this case, if the selected waveform is not used in List Sequence, it can be deleted and the ARB state is turned Off. If the ARB is ON and you load a file to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Delete All From ARB Memory

Allows you to remove all segments from ARB playback memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments in ARB Memory
Remote Command	`:SOURce:RADio:ARB:DELete:ALL`
Example	:SOUR:RAD:ARB:DELete:ALL
Notes	When in Sequence Analyzer mode and Include Source is Yes, an attempt to delete all files from ARB memory is rejected with an error. When Include Source is No and you attempt to delete all files from ARB memory when the ARB is currently playing a file, all files except the one playing are deleted and an error is generated. If you attempt to delete all files from ARB memory when there are waveform files used in "List Sequencer" on page 850 and "Sequencer" on page 851 state is ON, all files except the files currently being used in list sequencer are deleted, and an error is generated. If the ARB is ON and you load a file to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Query ARB Memory File List (Remote Command Only)

Queries the test set for the list of waveform segments in the ARB memory.

NOTE This command returns a string for waveform segment names in ARB memory. If you want a string list of waveform segments in the ARB memory, use "Query ARB Memory Full File List (Remote Command Only)" on page 812.

Remote Command	`:SOURce:RADio:ARB:CATalog?`
Example	:SOUR:RAD:ARB:CATalog?
Notes	The return data is in the following format: <integer> - memory used <integer> - memory free <string> ... - comma separated list of waveform segments within ARB memory
Initial S/W Revision	A.05.00

Query ARB Memory Full File List (Remote Command Only)

Queries the test set for the string list of waveform segments in the ARB memory. It returns a string list for waveform segment names in the ARB memory.

Remote Command	`:SOURce:RADio:ARB:FCATalog?`
Example	:SOUR:RAD:ARB:FCATalog?
Notes	The return data is in the following format: <integer> - memory used <integer> - memory free <integer> - file count in ARB memory <string>,<string>, ... <string> - comma separated string list of waveform segments within ARB memory Example: SOUR:RAD:ARB:FCAT? EXT returns: 27499,2069653,3,”c2k.wfm”,”gsm.wfm”,”wcdma.wfm”
Initial S/W Revision	A.09.00

ARB Setup

Allows access to the ARB setup sub-menus.

Key Path	Source, Modulation Setup, ARB
Initial S/W Revision	A.05.00

Sample Rate

Allows you to set the ARB waveform playback sample rate.

Key Path	Source, Modulation Setup, ARB, ARB Setup
Remote Command	`:SOURce:RADio:ARB:SCLock:RATE <freq>` `:SOURce:RADio:ARB:SCLock:RATE?`
Example	:SOUR:RAD:ARB:SCL:RATE 48.00 MHz
Notes	If there is a sample rate specified in the header of the waveform file, changing that sample rate is not recommended, as it may cause problems with burst timing.
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The sample rate is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the sample rate is updated with the value from the header file. The sample rate will remain unchanged if the newly selected waveform does not have an associated header file.
Preset	125.00 MHz
Min	1.00 kHz
Max	125.00 MHz
Initial S/W Revision	A.05.00

Run-Time Scaling

Allows you to adjust the run-time scaling value. The run-time scaling value is applied in real-time while the waveform is playing.

Key Path	Source, Modulation Setup, ARB, ARB Setup
Remote Command	`:SOURce:RADio:ARB:RSCaling <real>` `:SOURce:RADio:ARB:RSCaling?`
Example	:SOUR:RAD:ARB:RSC 100.00
Notes	This setting cannot be set in E6640A. Grey out on menu and the value is fixed at 70.00%.
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The run-time scaling is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the run-time scaling is updated with the value from the header file. The run-time scaling will remain unchanged if the newly selected waveform does not have an associated header file.
Preset	70.00 %
Min	1.00 %
Max	100.00 %
Initial S/W Revision	A.05.00

Baseband Freq Offset

Allows you to adjust the value by which the baseband frequency is offset relative to the carrier.

Key Path	Source, Modulation Setup, ARB, ARB Setup
Remote Command	`:SOURce:RADio:ARB:BASeband:FREQuency:OFFSet <freq>` `:SOURce:RADio:ARB:BASeband:FREQuency:OFFSet?`
Example	:SOUR:RAD:ARB:BAS:FREQ:OFFS 0.00 Hz
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The baseband frequency offset is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the baseband frequency offset is updated with the value from the header file. The baseband frequency offset will remain unchanged if the newly selected waveform does not have an associated header file.
Preset	0.00 Hz
Min	–50.00 MHz
Max	50.00 MHz
Initial S/W Revision	A.05.00

Trigger Type

Allows access to the trigger type sub-menus. The setting for trigger type determines the behavior of the waveform when it plays.

Key Path	Source, Modulation Setup, ARB
Remote Command	`:SOURce:RADio:ARB:TRIGger:TYPE CONTinuous | SINGle | SADVance GATE` `:SOURce:RADio:ARB:TRIGger:TYPE?`
Example	:SOUR:RAD:ARB:TRIG:TYPE CONT :SOUR:RAD:ARB:TRIG:TYPE?
Notes	Gated trigger type will be implemented at a later release
Preset	CONTinuous
Range	Continuous | Single | Seg Adv | Gated
Initial S/W Revision	A.05.00

Continuous

Sets the active trigger type to Continuous. If Continuous is already selected as the active trigger type, pressing this key allows access to the continuous trigger type setup menu. In Continuous trigger mode, the waveform repeats continuously.

Key Path	Source, Modulation Setup, ARB, Trigger Type
Remote Command	`:SOURce:RADio:ARB:TRIGger:TYPE:CONTinuous[:TYPE] FREE | TRIGger | RESet` `:SOURce:RADio:ARB:TRIGger:TYPE:CONTinuous[:TYPE]?`
Example	:SOUR:RAD:ARB:TRIG:TYPE:CONT FREE
Preset	FREE

Range	Free Run | Trigger + Run | Reset + Run
Initial S/W Revision	A.05.00

Free Run

Selects Free Run as the trigger response for the continuous trigger type. Free Run sets the waveform generator to play a waveform sequence or segment continuously, without waiting for a trigger. In this mode, the waveform generator does not respond to triggers.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Continuous
Example	:SOUR:RAD:ARB:TRIG:TYPE:CONT FREE
Initial S/W Revision	A.05.00

Trigger + Run

Sets Trigger and Run as the trigger response for the continuous trigger type. Trigger and Run sets the waveform generator to play a waveform sequence or segment continuously when the first trigger is received, and to ignore any subsequent triggers.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Continuous
Example	:SOUR:RAD:ARB:TRIG:TYPE:CONT TRIG
Initial S/W Revision	A.05.00

Reset + Run

Sets Reset and Run as the trigger response for the continuous trigger type. Reset and Run sets the waveform generator to play a waveform sequence or segment continuously when the first trigger is received. Subsequent triggers reset the waveform sequence or segment to the start, and then play it continuously.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Continuous
Example	:SOUR:RAD:ARB:TRIG:TYPE:CONT RES
Initial S/W Revision	A.05.00

Single

Sets the active trigger type to Single. If Single is already selected as the active trigger type, pressing this key allows access to the single trigger type setup menu. In Single trigger mode, the waveform plays once.

Key Path	Source, Modulation Setup, ARB, Trigger Type
Remote Command	`:SOURce:RADio:ARB:RETRigger ON|OFF|IMMediate`

	:SOURce:RADio:ARB:RETRigger?
Example	:SOUR:RAD:ARB:RETR OFF
Notes	ON: Buffered Trigger OFF: No Retrigger Immediate: Restart on Trigger This is defined as an enumerated SCPI command, with ON|OFF being considered as enumerated types rather than Boolean. This means the query will return OFF instead of 0, and ON instead of 1.
Preset	ON
Range	No Retrigger | Buffered Trigger | Restart on Trigger
Initial S/W Revision	A.05.00

No Retrigger

Selects No Retrigger as the trigger response for single trigger type. No Retrigger sets the waveform generator to play a waveform sequence or segment once when a trigger is received. Any triggers then received during playback are ignored.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Single
Example	:SOUR:RAD:ARB:RETR OFF
Initial S/W Revision	A.05.00

Buffered Trigger

Selects Buffered Trigger as the trigger response for single trigger type. Buffered Trigger sets the waveform generator to play a waveform sequence or segment once when a trigger is received. If a trigger is received during playback, the waveform generator plays the sequence or segment to the end, then plays the sequence or segment once more.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Single
Example	:SOUR:RAD:ARB:RETR ON
Initial S/W Revision	A.05.00

Restart on Trigger

Selects Restart on Trigger as the trigger response for single trigger type. Restart on Trigger sets the waveform generator to play a waveform sequence or segment once when a trigger is received. If a trigger is received during playback, the waveform generator resets and plays the sequence or segment from the start.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Single
Example	:SOUR:RAD:ARB:RETR IMM
Initial S/W Revision	A.05.00

Segment Advance

Sets the active trigger type to Segment Advance. If Segment Advance is already selected as the active trigger type, pressing this key allows access to the segment advance trigger type setup menu.

Segment Advance triggering allows you to control the playback of waveform segments within a waveform sequence. When a trigger is received the ARB advances to the next waveform segment within the waveform sequence. This type of triggering ignores the repetition count for the waveform segment within the waveform sequence. For example, if a waveform segment has a repetition count of 10 and you select single segment advance triggering mode, the waveform segment will only play once.

Segment Advance triggering can also be used for waveform segments only. In this situation the same waveform segment is played again when a trigger is received.

Key Path	Source, Modulation Setup, ARB, Trigger Type
Remote Command	`:SOURce:RADio:ARB:TRIGger:TYPE:SADVance[:TYPE] SINGle | CONTinuous` `:SOURce:RADio:ARB:TRIGger:TYPE:SADVance[:TYPE]?`
Example	:SOUR:RAD:ARB:TRIG:TYPE:SADV SING
Preset	CONTinuous
Range	Single | Continuous
Initial S/W Revision	A.05.00

Single

Selects Single as the trigger response for Segment Advance trigger type. With single selected, once a trigger is received a segment is played once. If a trigger is received during playback of a segment, the segment plays to completion and the next segment is played once.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Segment Advance
Example	:SOUR:RAD:ARB:TRIG:TYPE:SADV SING
Initial S/W Revision	A.05.00

Continuous

Selects Continuous as the trigger response for Segment Advance trigger type. With continuous selected, once a trigger is received a segment is played continuously. When subsequent triggers are received, the currently playing segment plays to completion and then the next segment is played continuously.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Segment Advance
Example	:SOUR:RAD:ARB:TRIG:TYPE:SADV CONT
Initial S/W Revision	A.05.00

Trigger Source

Allows access to the trigger source sub-menus. The trigger source setting determines how the source receives the trigger that starts the waveform playing. Therefore, this key is grayed out if the trigger type is free run, since free run triggers immediately with no trigger source required.

Key Path	Source, Modulation Setup, ARB
Remote Command	`:SOURce:RADio:ARB:TRIGger[:SOURce] KEY|BUS|EXTernal2` `:SOURce:RADio:ARB:TRIGger[:SOURce]?`
Example	:SOUR:RAD:ARB:TRIGger KEY
Dependencies	This key is grayed out if the current trigger type is Continuous, Free Run.
Preset	EXTernal2
Range	Trigger Key | Bus | External 2
Initial S/W Revision	A.05.00

Trigger Key

Sets the current trigger source to the front panel Trigger key. When Trigger Key is selected, the waveform is triggered when you press the front panel Trigger key.

Key Path	Source, Modulation Setup, ARB, Trigger Source
Example	:SOUR:RAD:ARB:TRIGger KEY
Initial S/W Revision	A.05.00

Bus

Sets the current trigger source to Bus. Selecting Bus trigger source enables triggering over GPIB, LAN, or USB using the :SOURce:RADio:ARB:TRIGger:INITiate command.

Key Path	Source, Modulation Setup, ARB, Trigger Source
Example	:SOUR:RAD:ARB:TRIGger BUS
Initial S/W Revision	A.05.00

External 2

Sets the current trigger source to External 2. Selecting External 2 enables triggering a waveform by an externally applied signal.

Key Path	Source, Modulation Setup, ARB, Trigger Source
Example	:SOUR:RAD:ARB:TRIGger EXT2
Notes	Note: When on E6640A, trigger 2 is a bi-directional trigger port. So when trigger 2 has been configured as OUTPUT type, choosing External 2 as the input trigger for the current step will generate error.
Initial S/W Revision	A.05.00

Trigger Initiate

Used to initiate an immediate trigger event if the trigger source is set to Trigger Key.

Key Path	Source, Modulation Setup, ARB
Notes	No remote command, SCPIfront panel only.
Initial S/W Revision	A.05.00

Waveform Sequences

Allows access to the waveform sequence sub-menus. Pressing this key changes the central view area to display the Waveform Sequence List view.

Key Path	Source, Modulation Setup, ARB
Notes	No remote command, SCPI front panel only.
Initial S/W Revision	A.05.00

Build New Sequence

Allows access to the sub-menus for creating a new waveform sequence. Pressing this key changes the central view area to display the Waveform Sequence Creation and Editing view.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences
Notes	No remote command, SCPIfront panel only.
Initial S/W Revision	A.05.00

Current Segment

Specifies the selected sequence segment that will be affected by the menu functions.

Key Path	Source, Modulation Setup , ARB, Waveform Sequences, Build New Sequence
Notes	No remote command, SCPI front panel only. This key is grayed out and unavailable if the sequence is currently empty.
Initial S/W Revision	A.05.00

Insert New Waveform

Allows you access to the sub-menu for inserting a new waveform segment or sequence. Pressing this key also changes the central display to show the Waveform File Selection View.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence
Notes	No remote command, SCPIfront panel only. Waveform segment name string length upper limit is 128 chars. Please do NOT insert waveform which name string exceeds 128 chars.
Initial S/W Revision	A.05.00

Insert Waveform

Inserts the currently highlighted waveform to the end of the waveform sequence. Pressing this key also returns you to the menus for creating or editing a sequence, and returns the central view to the sequence creation view.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform
Notes	No remote command, SCPIfront panel only. Waveform segment name string length upper limit is 128 chars. Please do NOT insert waveform which name string exceeds 128 chars.
Initial S/W Revision	A.05.00

Segments on Hard Disk

Allows you access to the sub-menus for loading waveform segments from the hard disk into ARB memory. The default directory is: D: varb.

Pressing this key changes the current view to the Waveform Management View.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Initial S/W Revision	A.05.00

Load Segment To ARB Memory

Allows you to load the selected file into ARB memory. On the front panel you select the file for loading to the ARB memory by highlighting the desired file in the list. Using the SCPI command, you specify the file name on the HDD.

“NVWFM” (none-volatile storage) MSUS (Mass Storage Unit Specifier) is supported in the memory subsystem because the ARB memory cannot be accessed directly. Therefore, files must be downloaded to the instrument hard disk and then loaded into the ARB memory. “NVWFM” MSUS will be mapped to the default directory D: VARB. The SCPI command supports using either “NVWFM” MSUS or specifying a full path. For more information, see Memory Subsystem (Remote Command Only).

If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MMEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:LOAD <string>`
Example	:SOUR:RAD:ARB:LOAD “D: VARB\testwaveform.bin” or :SOUR:RAD:ARB:LOAD “NVWFM:testwaveform.bin”
Notes	Because loading the file involves a delay of unpredictable length, this command should be followed by the query *OPC?, which holds off subsequent commands until the loading operating is complete. <string> – specifies the path name of the file to load from the HDD into ARB memory. It could be a <full path + filename>, or <“NVWFM” MSUS + colon + filename>. When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load a file to ARB memory will be rejected with an error. When Include Source is Noand if there is insufficient free ARB memory to load the selected waveform, an error is generated. . If you specify a file over SCPI, but the file is not at the specified location, an error is generated. If you try to load a waveform file but the file contains less than 500 IQ sampes, an error is generated. If you try to load a Signal Studio waveform “*.wfm” which contains invalid waveform header, an error is generated. If the ARB is ON when you load afile to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished. ARB can be loaded into ARB memory even required licenses do not present on the instrument. In this case, a GUI only warning message –800, “Operation complete; Loaded <filename> successfully, but no license <required licenses> installed”. User can install required licenses according to <required licenses> string to license it, or multi-pack license it.
Initial S/W Revision	A.05.00

Load All To ARB Memory

Allows you to load all the segment files within the currently selected directory into ARB memory. If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:LOAD:ALL <string>`

Example	:SOUR:RAD:ARB:LOAD:ALL “D: varb”
Notes	<string> - specifies the directory on the HDD to load the files into ARB memory from. When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load all files from a directory to ARB memory is rejected with an error. When Include Source is No and there is insufficient free ARB memory to load all the waveforms, when the ARB memory is full, the copy ceases, and an error is generated. If you specify a directory over SCPI, but the directory does not exist, an error is generated. If the ARB is ON, a user then loads or deletes file to ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Change Directory...

Allows you to change the currently selected directory on the hard disk. Pressing this key opens a standard windows change directory dialog allowing you to select the new directory of interest.

The current directory is used for manually loading waveform segments into ARB memory for playback, and as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence or a list sequence.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Notes	No remote command, SCPIfront panel only.
Initial S/W Revision	A.05.00

Default Directory...

Allows you to change the default directory. It is used as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence, and as a search location for selecting waveforms using SCPI.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:DEFault:DIRectory <string>` `:SOURce:RADio:ARB: DEFault:DIRectory?`
Example	:SOUR:RAD:ARB:DEF:DIR “D:\ArbFiles” :SOUR:RAD:ARB:DEF:DIR?
State Saved	Persistent, survives a power cycle and a preset but not saved in the instrument state
Initial S/W Revision	A.05.00

Segments in ARB Memory

Allows you access to the sub-menus for managing the files within ARB memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Initial S/W Revision	A.05.00

Delete Segment From ARB Mem

Allows you to remove a segment from ARB playback memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments in ARB Memory
Remote Command	`:SOURce:RADio:ARB:DELete <string>`
Example	:SOUR:RAD:ARB:DEL “testwaveform.bin”
Notes	<string> - specifies the waveform to be deleted from the ARB playback memory. When in Sequence Analyzer mode and Include Source is Yes, an attempt to delete a file from ARB memory is rejected with an error. When Include Source is No and you specify a file that does not exist within ARB memory, an error is generated. It is possible to delete files from within the ARB memory when the ARB is ON. However, if you attempt to delete the file that is currently playing an error is generated. It is possible to delete a file from within the ARB memory when the sequencer state is ON and the file is not being used by the List Sequencer. If you attempt to delete a file which is being used by the list sequencer, an error is generated. When sequencer state is On, even if ARB state is On, the selected waveform will not be played. In this case, if the selected waveform is not used in List Sequence, it can be deleted and the ARB state is turned Off. If the ARB is ON and you load a file to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Delete All From ARB Memory

Allows you to remove all segments from ARB playback memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments in ARB Memory
Remote Command	`:SOURce:RADio:ARB:DELete:ALL`
Example	:SOUR:RAD:ARB:DELete:ALL
Notes	When in Sequence Analyzer mode and Include Source is Yes, an attempt to delete all files from ARB memory is rejected with an error. When Include Source is No and you attempt to delete all files from ARB memory when the ARB is currently playing a file, all files except the one playing are deleted and an error is generated. If you attempt to delete all files from ARB memory when there are waveform files used in "List Sequencer" on page 850 and "Sequencer" on page 851 state is ON, all files except the files currently being used in list sequencer are deleted, and an error is generated.

	If the ARB is ON and you load a file to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Segments on Hard Disk

This key functions the same as "Segments on Hard Disk" on page 877.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform
Initial S/W Revision	Prior to A.09.00

Load Segment To ARB Memory

This key functions the same as "Load Segment To ARB Memory" on page 877.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Load All To ARB Memory

This key functions the same as "Load All To ARB Memory" on page 878.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Change Directory ...

This key functions the same as "Change Directory..." on page 879.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Default Directory ...

This key functions the same as "Default Directory..." on page 879

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Segments in ARB Memory

This key functions the same as "Segments in ARB Memory" on page 879.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform
Initial S/W Revision	Prior to A.09.00

Delete Segment From ARB Memory

This key functions the same as "Delete Segment From ARB Mem" on page 879.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform, Segment in ARB Memory
Initial S/W Revision	Prior to A.09.00

Delete All From ARB Memory

This key functions the same as "Delete All From ARB Memory" on page 880.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform, Segment in ARB Memory
Initial S/W Revision	Prior to A.09.00

Query ARB Memory File List (Remote Command Only)

This command functions the same as "Query ARB Memory File List (Remote Command Only)" on page 812.

Initial S/W Revision	Prior to A.09.00

Edit Selected Waveform

Allows access to the sub-menus for editing the details of the currently selected waveform segment.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence
Notes	No remote command, front panel only.
Initial S/W Revision	A.05.00

Repetitions

Allows you to specify the number of times the currently selected waveform is played within the sequence.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Edit Selected Waveform
Notes	No remote command, SCPIfront panel only.
Preset	1
Min	1
Max	65535
Initial S/W Revision	A.05.00

Marker 1

Allows you to enable or disable marker 1 for the currently selected waveform. For a waveform sequence, you can enable and disable markers on a per-segment basis, allowing you to output markers from some waveform segments within the sequence, but not for others.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Edit Selected Waveform
Notes	No remote command, front panel only.
Preset	Enabled
Range	Enabled|Disabled
Initial S/W Revision	A.05.00

Marker 2

Allows you to enable or disable marker 2 for the currently selected waveform. For a waveform sequence, you can enable and disable markers on a per-segment basis, allowing you to output markers from some waveform segments within the sequence, but not for others.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Edit Selected Waveform
Notes	No remote command, front panel only.
Preset	Enabled
Range	Enabled|Disabled
Initial S/W Revision	A.05.00

Marker 3

Allows you to enable or disable marker 3 for the currently selected waveform. For a waveform sequence, you can enable and disable markers on a per-segment basis, allowing you to output markers from some waveform segments within the sequence, but not for others.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Edit Selected

	Waveform
Notes	No remote command, front panel only.
Preset	Enabled
Range	Enabled|Disabled
Initial S/W Revision	A.05.00

Marker 4

Allows you to enable or disable marker 4 for the currently selected waveform. For a waveform sequence, you can enable and disable markers on a per-segment basis, allowing you to output markers from some waveform segments within the sequence, but not for others.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Edit Selected Waveform
Notes	No remote command, front panel only.
Preset	Enabled
Range	Enabled|Disabled
Initial S/W Revision	A.05.00

Delete Segment

Allows you to delete the selected segment from the waveform sequence.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence
Notes	No remote command, front panel only.
Initial S/W Revision	A.05.00

Save Sequence...

Pressing this key displays the “Save As” dialog. The sequence name is passed to the save as dialog to use as the filename for saving, and the directory the save as dialog will open into is the default waveform directory.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence
Initial S/W Revision	A.05.00

Build New Sequence (Remote Command Only)

This command is the SCPI equivalent of the waveform sequence creation features described in "Build New Sequence" on page 819.

This command writes a waveform sequence file to the hard disk. You must specify the waveform sequence file path and filename which will be saved on the hard disk, and the waveform segment file path and name which will be nested into the waveform sequence file. You can utilize mass storage unit specifier (MSUS) “NVWFM” or use a real full path representation. See the example below. MSUS “NVWFM” is mapped to D: VARB directory on test set hard disk.

Any number of segments, up to a segment count limit of 64, can be used to create a sequence. Repeated segments are included in the count limit.

Each waveform segment name string length upper limit is 128 chars. Please do NOT insert waveform which name string exceeds 128 chars.

The internal source does not support nesting one waveform sequence file into another waveform sequence file.

Remote Command	`:SOURce:RADio:ARB:SEQuence[:MWAVeform] <filename>, <waveform1>, <reps>, NONE | M1 | M2 | M3 | M4 | M1M2 | M1M3 | M1M4 | M2M3 | M2M4 | M3M4 | M1M2M3 | M1M2M4 | M1M3M4 | M2M3M4 | M1M2M3M4 | ALL, {<waveform2>, <reps>, NONE | M1 | M2 | M3 | M4 | M1M2 | M1M3 | M1M4 | M2M3 | M2M4 | M3M4 | M1M2M3 | M1M2M4 | M1M3M4 | M2M3M4 | M1M2M3M4 | ALL, } …` (For additional description of each item, see Notes below "For Setup SCPI" on page 586“For Setup SCPI”.) `:SOURce:RADio:ARB:SEQuence[:MWAVeform]? <filename>` (For additional description of each item, see Notes "For Query SCPI" on page 587 below.)
Example	For setup: >:SOUR:RAD:ARB:SEQ “NVWFM:testSeq1.seq”, “NVWFM:wfmSegment1.wfm”, 10, M2M3M4, “NVWFM:wfmSegment2.wfm”, 20, M1M3 Or >:SOUR:RAD:ARB:SEQ “D: VARB\testSeq1.seq”, “ D: VARB\wfmSegment1.wfm”, 10, M2M3M4, “ D: VARB\wfmSegment2.wfm”, 20, M1M3 For query, must specify which waveform sequence file to query. >:SOUR:RAD:ARB:SEQ? “NVWFM:testSeq1.seq” Or >:SOUR:RAD:ARB:SEQ? “D: VARB\testSeq1.seq”,
Notes	## For Setup SCPI For the Setup SCPI command, the parameters are: <filename> - String Type This variable specifies the path and name for the waveform sequence file. The path supports MSUS (NVWFM) or a real full path representation. See example. <waveform1> - String Type This variable specifies the path and name of the first existing waveform segment. The path supports MSUS (NVWFM) or a real full path representation. See example. The segment file must reside within ARB playback memory before it can be played by the ARB player. <reps> - Integer Type

	This variable specifies the number of times a segment or sequence plays before moving on to the next segment or sequence. <marker> - Enum Type NONE – This choice disables all four markers for the waveform. Disabling markers means that the waveform sequence ignores the segments or sequence marker settings. M1, M2, M3, M4 – these choices, either individually or a combination of them, enable the markers for the waveform segment or sequence. Markers not specified are ignored for that segment or sequence. ALL – This choice enables all four markers in the waveform segment or sequence. <waveform2> - String type. This variable specifies the name of a second existing waveform segment. The path supports MSUS (NVWFM) and real full path representation both. See example. The segment file must reside within ARB playback memory before it can be played by the ARB player. <reps> same as above, for the 2nd waveform segment. <marker> same as above, for the 2nd waveform segment. You can insert several waveform segments into a waveform sequence file. Just repeat inserting waveform segments as described above. Error Checks for Setup SCPI command: If you do not specify a filename, or you use an unsupported MSUS (that is, not NVWFM), or have an error in the waveform sequence file path, an error is generated.
Notes	Error Checks for Query SCPI command: (Continued) If the specified waveform sequence file name suffix is not ".seq", error is generated. If you use an unsupported MSUS (that is, not NVWFM), or have an error in the waveform segment file path, an error is generated. If the first specified waveform file cannot be found, an error is generated. If you nest one waveform sequence file into another waveform sequence file, an error is generated. If the specified repetition value is larger than 65535 or smaller than 1, an error is generated. If the specified marker type is unrecognized, an error is generated. For Query SCPI For the Query the parameters are: <filename> - String type. This variable specifies the path and name of the waveform sequence file being queried. The path supports MSUS (NVWFM) or a real full path representation. See example. The return value is a <string>, which includes each waveform segment file name, repetitions, and marker type. For example: >:SOUR:RAD:ARB:SEQ? "NVWFM:testSeq1.seq", <"wfmSegment1. wfm, 10, ALL, wfmSegment2.wfm, 20, M1M3", Error Checks for Query SCPI command: If you do not specify a filename, an error is generated. If the waveform sequence file name is empty, an error is generated. If the specified waveform sequence file cannot be found, an error is generated.
Initial S/W Revision	A.05.00

Edit Selected Sequence

Allows access to the sub-menus for editing the sequence currently selected within the Waveform Sequence List view. Pressing this key changes the central view area to display the Waveform Sequence Creation and Editing view.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences
Notes	No remote command, front panel only.
Initial S/W Revision	A.05.00

Current Directory...

Allows you to change the currently selected directory on the hard disk. Pressing this key opens a standard windows change directory dialog and allows you to select the new directory of interest.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences
Notes	No remote command, front panel only.
Initial S/W Revision	A.05.00

Waveform Utilities

Allows you access to the waveform utilities sub-menus.

Key Path	Source, Modulation Setup, ARB
Initial S/W Revision	A.05.00

Multi-Pack Licenses

Allows you access to the Multi - Pack License sub-menus. Pressing this key also changes the central view area to display the Multi -Pack License Management view.

On modular instrument like E6630A or E6640A, multi-pack license operations are only allowed on the default module, i.e. “Left” module for E6630A or “TRX1” module for E6640A.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities
Notes	If access multi-pack license sub-menu from modules other than “TRX1”, an advisory message like “Please goto “TRX1” to operate multi-pack license” will display.
Dependencies	This key is only available if there is at least one Multi-pack license installed on the instrument.
Initial S/W Revision	A.05.00

Add Waveform

Pressing this key accesses the Add Waveform sub-menu. It also changes the central display area to display the Multi-Pack License Waveform Add view.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses
Dependencies	This key is only available if there is at least one slot available within at least one multi-pack license.
Initial S/W Revision	A.05.00

Add Waveform

Allows you to add the currently selected waveform segment to a multi-pack license. The new waveform is added to the next available slot regardless of which slot was selected on the Multi-Pack License Management view.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Add Waveform

Remote Command	`:SYSTem:LKEY:WAVeform:ADD <string>`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:ADD <string>`

Example	SYST:LKEY:WAV:ADD “mywaveform.wfm” or SYST:LIC:WAV:ADD “mywaveform.wfm”
Notes	The second SCPI :SYSTem:LICense[:FPACk]:WAVeform:ADD is provided to be consistent with the style of Agilent signal sources. You can use either one of them. Since adding a waveform segment to a Multi-Pack license causes the license slot to enter the trial period of only 48 hours, pressing this key causes a confirmation dialog to be displayed to ensure you do want to add the waveform segment to the Multi-Pack. If you attempt to license a waveform that is already licensed using another slot an error is generated. . If current module is not “TRX1” module, the key will grey out, and error message is generated “–221 Setting conflict; Not allowed on current module. Goto “TRX1” to operate multi-pack license” when invoking SCPI.
Dependencies	This key is only available if the currently selected file is a secure waveform requiring a license, and there is at least one slot available within at least one multi-pack license. If the waveform highlighted is a secure waveform, but is already licensed, this key will be unavailable.
Initial S/W Revision	A.05.00

Segments on Hard Disk

Allows you access to the sub-menus for loading waveform segments from the hard disk into ARB memory. The default directory is: D: varb.

Pressing this key changes the current view to the Waveform Management View.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Initial S/W Revision	A.05.00

Load Segment To ARB Memory

Allows you to load the selected file into ARB memory. On the front panel you select the file for loading to the ARB memory by highlighting the desired file in the list. Using the SCPI command, you specify the file name on the HDD.

“NVWFM” (none-volatile storage) MSUS (Mass Storage Unit Specifier) is supported in the memory subsystem because the ARB memory cannot be accessed directly. Therefore, files must be downloaded to the instrument hard disk and then loaded into the ARB memory. “NVWFM” MSUS will be mapped to the default directory D: VARB. The SCPI command supports using either “NVWFM” MSUS or specifying a full path. For more information, see Memory Subsystem (Remote Command Only).

If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MMEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:LOAD <string>`
Example	:SOUR:RAD:ARB:LOAD “D: VARB\testwaveform.bin” or :SOUR:RAD:ARB:LOAD “NVWFM:testwaveform.bin”
Notes	Because loading the file involves a delay of unpredictable length, this command should be followed by the query *OPC?, which holds off subsequent commands until the loading operating is complete. <string> – specifies the path name of the file to load from the HDD into ARB memory. It could be a <full path + filename>, or <“NVWFM” MSUS + colon + filename>. When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load a file to ARB memory will be rejected with an error. When Include Source is Noand if there is insufficient free ARB memory to load the selected waveform, an error is generated. . If you specify a file over SCPI, but the file is not at the specified location, an error is generated. If you try to load a waveform file but the file contains less than 500 IQ sampes, an error is generated. If you try to load a Signal Studio waveform “*.wfm” which contains invalid waveform header, an error is generated. If the ARB is ON when you load afile to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished. ARB can be loaded into ARB memory even required licenses do not present on the instrument. In this

	case, a GUI only warning message –800, “Operation complete; Loaded <filename> successfully, but no license <required licenses> installed”. User can install required licenses according to <required licenses> string to license it, or multi-pack license it.
Initial S/W Revision	A.05.00

Load All To ARB Memory

Allows you to load all the segment files within the currently selected directory into ARB memory. If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:LOAD:ALL <string>`
Example	:SOUR:RAD:ARB:LOAD:ALL “D: varb”
Notes	<string> - specifies the directory on the HDD to load the files into ARB memory from. When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load all files from a directory to ARB memory is rejected with an error. When Include Source is No and there is insufficient free ARB memory to load all the waveforms, when the ARB memory is full, the copy ceases, and an error is generated. If you specify a directory over SCPI, but the directory does not exist, an error is generated. If the ARB is ON, a user then loads or deletes file to ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Change Directory...

Allows you to change the currently selected directory on the hard disk. Pressing this key opens a standard windows change directory dialog allowing you to select the new directory of interest.

The current directory is used for manually loading waveform segments into ARB memory for playback, and as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence or a list sequence.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Notes	No remote command, SCPIfront panel only.
Initial S/W Revision	A.05.00

Default Directory...

Allows you to change the default directory. It is used as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence, and as a search location for selecting waveforms using SCPI.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:DEFault:DIRectory <string>` `:SOURce:RADio:ARB: DEFault:DIRectory?`
Example	:SOUR:RAD:ARB:DEF:DIR “D:\ArbFiles” :SOUR:RAD:ARB:DEF:DIR?
State Saved	Persistent, survives a power cycle and a preset but not saved in the instrument state
Initial S/W Revision	A.05.00

Segments on Hard Disk

This key functions the same as "Segments on Hard Disk" on page 877.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Add Waveform
Initial S/W Revision	Prior to A.09.00

Load Segment To ARB Memory

This key functions the same as "Load Segment To ARB Memory" on page 877.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Add Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Load All To ARB Memory

This key functions the same as "Load All To ARB Memory" on page 878.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Add Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Change Directory ...

This key functions the same as "Change Directory..." on page 879.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Add Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Default Directory ...

This key functions the same as "Default Directory..." on page 879

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Add Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Replace Waveform

Pressing this key accesses the Replace Waveform submenu. It also changes the central display area to display the Multi-Pack License Waveform Add view.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses
Dependencies	This key is only available if the currently selected slot is in the trial state.
Initial S/W Revision	A.05.00

Replace Waveform

Allows you to replace the waveform in the currently selected slot with the waveform currently selected in the Multi-Pack License Waveform Add view.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Replace Waveform

Remote Command	`:SYSTem:LKEY:WAVeform:REPLace <int>, <string>`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:REPLace <int>, <string>`

Example	SYST:LKEY:WAV:REPL 1, “myotherwaveform.wfm” or :SYST:LIC:WAV:REPL 1, “myotherwaveform.wfm”
Notes	The second SCPI :SYSTem:LICense[:FPACk]:WAVeform:REPLace is provided to be consistent with the style of Agilent signal sources. You can use either one of them. If you attempt to license a waveform that is already licensed using another slot an error is generated. Waveform slot number <int> is positive. If you attmpt to input a slot number less than or equals 0, an error is generated. If current module is not “TRX1” module, the key will grey out, and error message is generated “–221 Setting conflict; Not allowed on current module. Goto “TRX1” to operate multi-pack license” when invoking SCPI.
Initial S/W Revision	A.05.00

Segments on Hard Disk

This key functions the same as "Segments on Hard Disk" on page 877.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Replace Waveform
Initial S/W Revision	Prior to A.09.00

Load Segment To ARB Memory

This key functions the same as "Load Segment To ARB Memory" on page 877.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Replace Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Load All To ARB Memory

This key functions the same as "Load All To ARB Memory" on page 878.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Replace Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Change Directory ...

This key functions the same as "Change Directory..." on page 879.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Replace Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Default Directory ...

This key functions the same as "Default Directory..." on page 879

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Replace Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Clear Waveform from Slot

Allows you to clear the waveform from the selected slot.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses

Remote Command	`:SYSTem:LKEY:WAVeform:CLEar <int>`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:CLEar <int>`

Example	SYST:LKEY:WAV:CLE 1 or :SYST:LIC:WAV:CLE 1
Notes	The second SCPI :SYSTem:LICense[:FPACk]:WAVeform:CLEar is provided to be consistent with the style of Agilent signal sources. You can use either one of them. Waveform slot number <int> is positive. If you attmpt to input a slot number less than or equals 0, an error is generated. If current module is not "TRX1" module, the key will grey out, and error message is generated "–221 Setting conflict; Not allowed on current module. Goto "TRX1" to operate multi-pack license" when invoking SCPI.
Dependencies	This key is only available if the currently selected slot is in the trial state.
Initial S/W Revision	A.05.00

Lock Waveform in Slot

If the selected slot is in the trial state or the lock required state, the waveform that occupies the slot is locked and permanently licensed.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses

Remote Command	`:SYSTem:LKEY:WAVeform:LOCK <int>`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:LOCK <int>`

Example	SYST:LKEY:WAV:LOCK 1 or SYST:LIC:WAV:LOCK 1
Notes	The second SCPI :SYSTem:LICense[:FPACk]:WAVeform:LOCK is provided to be consistent with the style of Agilent signal sources. You can use either one of them. Waveform slot number <int> is positive. If you attmpt to input a slot number less than or equals 0, an error is generated. If current module is not "TRX1" module, the key will grey out, and error message is generated "–221 Setting conflict; Not allowed on current module. Goto "TRX1" to operate multi-pack license" when invoking SCPI.
Dependencies	This key is only available if the currently selected slot is in the trial state or the lock required state.
Initial S/W Revision	A.05.00

Slot Status Query (Remote Command Only)

Returns the status of the specified slot.

Remote Command	`:SYSTem:LKEY:WAVeform:STATus? <int>`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:STATus? <int>`

Example	:SYST:LKEY:WAV:STAT? 1 <"Locked" or :SYST:LIC:WAV:STAT? 1 <"Locked"
Notes	The second SCPI :SYSTem:LICense[:FPACk]:WAVeform:STATus is provided to be consistent with the style of Agilent signal sources. You can use either one of them. Waveform slot number <int> is positive. If you attmpt to input a slot number less than or equals 0, an error is generated. Result type is string. If input slot number exceeds total available slot number, “Nonexistent” is returned.
Range	"Locked" | "Available" | “Trail” | “LockRequired” | “Nonexistent”
Initial S/W Revision	A.05.00

Slots Free Query (Remote Command Only)

Returns the number of license slots free.

Remote Command	`:SYSTem:LKEY:WAVeform:FREE?`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:FREE?`

Example	:SYST:LKEY:WAV:FREE? or :SYST:LIC:WAV:FREE?
Notes	The second SCPI :SYSTem:LICense[:FPACk]:WAVeform:FREE is provided to be consistent with the style of Agilent signal sources. You can use either one of them.
Initial S/W Revision	A.05.00

Slot Used Query (Remote Command Only)

Returns the number of license slots used.

Remote Command	`:SYSTem:LKEY:WAVeform:USED?`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:USED?`

Example	:SYST:LKEY:WAV:USED?

	or :SYST:LIC:WAV:USED?
Notes	The second SCPI :SYSTem:LICense[:FPACk]:WAVeform:USED is provided to be consistent with the style of Agilent signal sources. You can use either one of them.
Initial S/W Revision	A.05.00

Slot Waveform Name Query (Remote Command Only)

Returns the waveform name of the specified slot

Remote Command	`:SYSTem:LKEY:WAVeform:NAME? <int>`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:NAME? <int>`

Example	:SYST:LKEY:WAV:NAME? 1 <"CDMA2K_22.wfm" or :SYST:LIC:WAV:NAME? 1 <"CDMA2K_22.wfm"
Notes	Waveform slot number <int> is positive. If you attmpt to input a slot number less than or equals 0, an error is generated. Result type is string. If input slot number exceeds total available slot number, “Nonexistent” is returned. If no waveform stored in the specified slot, then empty string is returned.
Initial S/W Revision	A.12.00

Slot Waveform Unique ID Query (Remote Command Only)

Returns the waveform unique ID of the specified slot

Remote Command	`:SYSTem:LKEY:WAVeform:UID? <int>`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:UID? <int>`

Example	:SYST:LKEY:WAV:UID? 2 <"1346752140" or :SYST:LIC:WAV:UID? 2 <"1346752140"
Notes	Waveform slot number <int> is positive. If you attmpt to input a slot number less than or equals 0, an error is generated. Result type is string. If input slot number exceeds total available slot number, “Nonexistent” is returned.

	If no waveform stored in the specified slot, then “0” is returned
Initial S/W Revision	A.12.00

Locked Waveform Name List Query (Remote Command Only)

Returns the waveform name list of locked.

Remote Command	`:SOURce:RADio:ARB:MPLicensed:NAME:LOCKed?`
Example	SOUR:RAD:ARB:MPL:NAME:LOCKed? <"CDMA2K_27.wfm", "GSM_MCS1.WFM", "c2kWfm.wfm"
Initial S/W Revision	A.11.00

Locked Waveform Unique ID List Query (Remote Command Only)

Returns the waveform unique id list of locked.

Remote Command	`:SOURce:RADio:ARB:MPLicensed:UID:LOCKed?`
Example	SOUR:RAD:ARB:MPL:UID:LOCKed? <"2996927136","3812603511","3710986266"
Notes	Each Signal Studio waveform has a unique id recorded in header. So if the unique ids are same, that means they are same one waveform. So besides SCPI to query locked waveform name list, also provide a SCPI to query locked waveform unique id list
Initial S/W Revision	A.11.00

Marker Utilities

Allows access to the marker utilities sub-menus.

Key Path	Source, Modulation Setup, ARB
Initial S/W Revision	A.05.00

Marker Polarity

Allows access to the marker polarity sub-menu, which allows you to specify the polarity for the four markers. For a positive polarity, the marker signal is high during the marker points. For a negative marker polarity, the marker signal is high during the period of no marker points.

Key Path	Source, Modulation Setup, ARB, Marker Utilities
Initial S/W Revision	A.05.00

Mkr 1 Polarity

Allows you to set the polarity of marker 1.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Polarity
Remote Command	`:SOURce:RADio:ARB:MPOLarity:MARKer1 POSitive|NEGative` `:SOURce:RADio:ARB:MPOLarity:MARKer1?`
Example	:SOUR:RAD:ARB:MPOL:MARK1 NEG
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The marker polarity is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the marker polarity is updated with the value from the header file. The marker polarity will remain unchanged if the newly selected waveform does not have an associated header file.
Preset	Pos
Range	Neg | Pos
Initial S/W Revision	A.05.00

Mkr 2 Polarity

Allows you to set the polarity of marker 2.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Polarity
Remote Command	`:SOURce:RADio:ARB:MPOLarity:MARKer2 POSitive|NEGative` `:SOURce:RADio:ARB:MPOLarity:MARKer2?`
Example	:SOUR:RAD:ARB:MPOL:MARK2 NEG
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The marker polarity is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the marker polarity is updated with the value from the header file. The marker polarity will remain unchanged if the newly selected waveform does not have an associated header file.
Preset	Pos
Range	Neg | Pos
Initial S/W Revision	A.05.00

Mkr 3 Polarity

Allows you to set the polarity of marker 3.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Polarity
Remote Command	`:SOURce:RADio:ARB:MPOLarity:MARKer3 POSitive|NEGative` `:SOURce:RADio:ARB:MPOLarity:MARKer3?`
Example	:SOUR:RAD:ARB:MPOL:MARK3 NEG
Dependencies	When a new waveform is selected for playback the settings contained within the associated

	waveform header file are applied to the ARB. The marker polarity is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the marker polarity is updated with the value from the header file. The marker polarity will remain unchanged if the newly selected waveform does not have an associated header file.
Preset	Pos
Range	Neg | Pos
Initial S/W Revision	A.05.00

Mkr 4 Polarity

Allows you to set the polarity of marker 4.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Polarity
Remote Command	`:SOURce:RADio:ARB:MPOLarity:MARKer4 POSitive|NEGative` `:SOURce:RADio:ARB:MPOLarity:MARKer4?`
Example	:SOUR:RAD:ARB:MPOL:MARK4 NEG
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The marker polarity is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the marker polarity is updated with the value from the header file. The marker polarity will remain unchanged if the newly selected waveform does not have an associated header file.
Preset	Pos
Range	Neg | Pos
Initial S/W Revision	A.05.00

Marker Routing

Allows access to the marker routing sub-menus, which allow you to specify where the marker events are routed. It should be noted that the markers can also be routed to Trigger 1 Out and Trigger 2 Out, however this must be set up using the menus accessed by pressing the “Trigger” hard key.

Key Path	Source, Modulation Setup, ARB, Marker Utilities
Initial S/W Revision	A.05.00

Pulse/RF Blank

Allows you to select which marker is used for the pulse/RF blanking function. The pulse/RF blanking function blanks the RF when the marker signal goes low. The marker polarity determines when the marker signal is high. For a positive polarity, this is during the marker points. For a negative polarity, this is when there are no marker points.

Marker points should be set before using this function. Enabling this function without setting maker points may create a continuous low or high signal, dependant on the marker polarity. This causes either no RF output, or a continuous RF output.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing
Remote Command	`:SOURce:RADio:ARB:MDEStination:PULSe NONE|M1|M2|M3|M4` `:SOURce:RADio:ARB:MDEStination:PULSe?`
Example	:SOUR:RAD:ARB:MDES:PULS NONE
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The pulse/RF blanking setting is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the pulse/RF blanking setting is updated with the value from the header file. The pulse/RF blanking setting will remain unchanged if the newly selected waveform does not have an associated header file.
Range	None | M1 | M2 | M3 | M4
Initial S/W Revision	A.05.00

None

Sets no marker to be used for the pulse/RF blanking function, essentially turning the RF blanking function off.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, Pulse/RF Blank
Example	:SOUR:RAD:ARB:MDES:PULS NONE
Initial S/W Revision	A.05.00

Marker 1

Sets marker 1 to be used for the pulse/RF blanking function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, Pulse/RF Blank
Example	:SOUR:RAD:ARB:MDES:PULS M1
Initial S/W Revision	A.05.00

Marker 2

Sets marker 2 to be used for the pulse/RF blanking function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, Pulse/RF Blank
Example	:SOUR:RAD:ARB:MDES:PULS M2
Initial S/W Revision	A.05.00

Marker 3

Sets marker 3 to be used for the pulse/RF blanking function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, Pulse/RF Blank
Example	:SOUR:RAD:ARB:MDES:PULS M3
Initial S/W Revision	A.05.00

Marker 4

Sets marker 4 to be used for the pulse/RF blanking function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, Pulse/RF Blank
Example	:SOUR:RAD:ARB:MDES:PULS M4
Initial S/W Revision	A.05.00

ALC Hold

Allows you to specify which marker is routed for use within the ALC hold function. The ALC hold marker function holds the ALC circuitry at the average value of the sample points set by the marker.

The ALC hold function operates during the low periods of the marker signal. The marker polarity determines when the marker signal is high. For positive polarity, this is during the marker points. For a negative polarity, this is when there are no maker points.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing
Remote Command	`:SOURce:RADio:ARB:MDEStination:ALCHold NONE|M1|M2|M3|M4` `:SOURce:RADio:ARB:MDEStination:ALCHold?`
Example	:SOUR:RAD:ARB:MDES:ALCH NONE
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The ALC hold setting is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the ALC hold setting is updated with the value from the header file. The ALC hold setting will remain unchanged if the newly selected waveform does not have an associated header file.
Range	None | M1 | M2 | M3 | M4
Initial S/W Revision	A.05.00

None

Sets no marker to be used for the ALC hold function, essentially turning the ALC hold function off.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, ALC Hold
Example	:SOUR:RAD:ARB:MDES:PULS NONE
Initial S/W Revision	A.05.00

Marker 1

Sets marker 1 to be used for the ALC hold function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, ALC Hold
Example	:SOUR:RAD:ARB:MDES:PULS M1
Initial S/W Revision	A.05.00

Marker 2

Sets marker 2 to be used for the ALC hold function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, ALC Hold
Example	:SOUR:RAD:ARB:MDES:PULS M2
Initial S/W Revision	A.05.00

Marker 3

Sets marker 3 to be used for the ALC hold function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, ALC Hold
Example	:SOUR:RAD:ARB:MDES:PULS M3
Initial S/W Revision	A.05.00

Marker 4

Sets marker 4 to be used for the ALC hold function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, ALC Hold
Example	:SOUR:RAD:ARB:MDES:PULS M4
Initial S/W Revision	A.05.00

Header Utilities

Allows access to the header utilities sub-menu. Pressing this key also causes the central display area to change to display the File Header Information view.

Key Path	Source, Modulation Setup, ARB
Dependencies	This key is only available if there is currently a waveform selected for playback. If no waveform is selected, the key is grayed out.
Initial S/W Revision	A.05.00

Clear Header

Allows you to clear the header information from the file header associated with the currently selected waveform.

Key Path	Source, Modulation Setup, ARB, Header Utilities
Remote Command	`:SOURce:RADio:ARB:HEADer:CLEar`
Example	:SOUR:RAD:ARB:HEAD:CLE
Notes	Attempting to clear the header details via SCPI when no waveform was selected for playback will generate an error.
Initial S/W Revision	A.05.00

Save Setup To Header

Allows you to save new file header information details to the file.

Key Path	Source, Modulation Setup, ARB, Header Utilities
Remote Command	`:SOURce:RADio:ARB:HEADer:SAVE`
Example	:SOUR:RAD:ARB:HEAD:SAVE
Notes	Attempting to save the header details via SCPI when no waveform was selected for playback will generate an error.
Initial S/W Revision	A.05.00

Query Waveform Unique ID (Remote Command Only)

Each Signal Studio waveform contains a unique waveform ID, which recorded in the header. This command allows you to query the unique waveform ID from the header. This is a SCPI only command. User can also checkError! Reference source not found. for waveform unique ID display.

Remote Command	`:MMEMory:HEADer:ID? "<file name>"`
Example	:MMEM:HEAD:ID? “test.wfm” (query the waveform already loaded into the ARB memory) :MMEM:HEAD:ID? “D: VARB\test.wfm” (query the waveform on the hard disk by absolute path) :MMEM:HEAD:ID? “NVWFM:test.wfm” (query the waveform on the hard disk by MSUS)
Notes	SCPI query only. The queried waveform file can be in ARB memory, or on hard disk. If want to query ARB in ARB memory, then give out the file name directly. If want to query ARB on the hard disk, then absolute file path or MSUS should be given along with the file name. The valid MSUS is “NVWFM” which is mapped to D: VARB on hard disk. If the file cannot be found in ARB memory or on hard disk, an error is generated.and value –1 is returned
Initial S/W Revision	A.09.00

Bus Trigger Command (Remote Command Only)

Used to initiate an immediate trigger event if the trigger source is set to Bus.

Remote Command	`:SOURce:RADio:ARB:TRIGger:INITiate`
Example	:SOUR:RAD:ARB:TRIG:INIT
Initial S/W Revision	A.05.00

AM

Allows access to the menu for configuring the Amplitude Modulation.

Key Path	Source, Modulation Setup
Initial S/W Revision	A.05.00

AM

Enables or disables the amplitude modulation.

Turning AM on when another modulation format is already on results in the previous modulation format being turned off and the generation of an error.

Key Path	Source, Modulation Setup, AM
Remote Command	`:SOURce:AM:STATe` `:SOURce:AM:STATe?`
Example	:SOUR:AM:STAT OFF
Preset	Off
Range	On | Off
Initial S/W Revision	A.05.00

AM Depth

Allows you to set the amplitude modulation depth in percent.

Key Path	Source, Modulation Setup, AM
Remote Command	`:SOURce:AM[:DEPTh][:LINear]` `:SOURce:AM[:DEPTh][:LINear]?`
Example	:SOUR:AM 0.1
Preset	0.1 %
Min	0.1 %
Max	95.0 %
Initial S/W Revision	A.05.00

AM Rate

Allows you to set the internal amplitude modulation rate.

Key Path	Source, Modulation Setup, AM
Remote Command	:SOURce:AM:INTernal:FREQuency :SOURce:AM:INTernal:FREQuency?
Example	:SOUR:AM:INT:FREQ 40.0 Hz
Preset	400.0 Hz
Min	10 Hz
Max	40 kHz
Initial S/W Revision	A.05.00

FM

Allows access to the menu for configuring the frequency modulation.

Key Path	Source, Modulation Setup
Initial S/W Revision	A.05.00

FM

Enables or disables the frequency modulation.

Turning FM on when another modulation format is already on results in the previous modulation format being turned off and the generation of an error.

Key Path	Source, Modulation Setup, FM
Remote Command	:SOURce:FM:STATe :SOURce:FM:STATe?
Example	:SOUR:FM:STAT OFF
Preset	Off
Range	On | Off
Initial S/W Revision	A.05.00

FM Deviation

Allows you to set the frequency modulation deviation.

Key Path	Source, Modulation Setup, FM

Remote Command	:SOURce:FM[:DEViation] :SOURce:FM[:DEViation]?
Example	:SOUR:FM 1.00 kHz
Preset	1.00 Hz
Min	1.00 Hz
Max	100.00 kHz
Initial S/W Revision	A.05.00

FM Rate

Allows you to set the internal frequency modulation rate.

Key Path	Source, Modulation Setup, FM
Remote Command	:SOURce:FM:INTernal:FREQuency :SOURce:FM:INTernal:FREQuency?
Example	:SOUR:FM:INT:FREQ 40.0 Hz
Preset	400.0 Hz
Min	10 Hz
Max	40 kHz
Initial S/W Revision	A.05.00

PM

Allows access to the menu for configuring the phase modulation.

Key Path	Source, Modulation Setup
Initial S/W Revision	A.05.00

PM

Enables or disables the phase modulation.

Turning PM on when another modulation format is already on results in the previous modulation format being turned off and the generation of an error.

Key Path	Source, Modulation Setup, PM
Remote Command	:SOURce:PM:STATe :SOURce:PM:STATe?
Example	:SOUR:PM:STAT OFF

Preset	Off
Range	On | Off
Initial S/W Revision	A.05.00

PM Deviation

Allows you to set the phase modulation deviation.

Key Path	Source, Modulation Setup, PM
Remote Command	`:SOURce:PM[:DEViation]` `:SOURce:PM[:DEViation]?`
Example	:SOUR:PM 1.00 rad
Preset	0.1 rad
Min	0.1 rad
Max	20.0 rad
Initial S/W Revision	A.05.00

PM Rate

Allows you to set the internal phase modulation rate.

Key Path	Source, Modulation Setup, PM
Remote Command	`:SOURce:PM:INTernal:FREQuency` `:SOURce:PM:INTernal:FREQuency?`
Example	:SOUR:PM:INT:FREQ 40.0 Hz
Preset	400.0 Hz
Min	10 Hz
Max	40 kHz
Initial S/W Revision	A.05.00

List Sequencer

Allows you access to the sub-menus for configuring the list sequencer.

List sequences allows you to enter frequencies and amplitudes at unequal intervals in nonlinear ascending, descending or random order. Each step within the list can also include its own waveform file for playback, step duration, trigger event and trigger output.

The complexities involved in configuring the list sequencer do not lend itself to manual configuration; hence the manual configuration for this feature is limited. For easier configuration of the list sequencer, it is recommended that you use either SCPI or load a tab delimited file containing the setup parameters in a

tabular form. The details of the SCPI for configuring the list sequencer can be found in "Step Configuration (Remote Command Only)" on page 884.

Once the List Sequencer has been configured using the front panel, SCPI, or loading in a tab delimited file, the sequence must be initiated using the front panel Initiate Sequence key or the corresponding SCPI command.

Key Path	Source
Initial S/W Revision	A.05.00

Sequencer

Allows you to set the state of the list sequencer. When the list sequencer is on, the source is outputting the sequence defined by the sequencer. When the list sequencer is off, the source outputs a single waveform segment or sequence (independent mode) at a single frequency and amplitude.

Key Path	Source, List Sequencer
Remote Command	`:SOURce:LIST[:STATe] ON|OFF|1|0` `:SOURce:LIST[:STATe]?`
Example	:SOUR:LIST OFF
Notes	When the sequencer is set to ON, the list sequencer controls the output of the source.
Couplings	When in Sequence Analyzer mode and the list sequencer state is Off, Include Source is forced to No, and the Include Source key is grayed out. When in Sequence Analyzer mode and the list sequencer state is On, Include Source is available to set. And, an ARB memory related operation, like load or delete will be rejected.
Preset	Off
Range	On | Off
Initial S/W Revision	A.05.00

Initiate Sequence

Pressing this key arms the sequence for single execution. Once the sequence is armed the source begins the sequence as soon as the trigger is received. If the trigger is set to Free Run, the sequence starts immediately.

Key Path	Source, List Sequencer
Remote Command	`:SOURce:LIST:TRIGger[:IMMediate]`
Example	:SOUR:LIST:TRIG
Notes	When in Sequence Analyzer mode and Include Source is Yes, the Initiate list sequencer operation is rejected, and the key is grayed out, since source list sequence request is sent to physics via Parallel batch by sequence analyzer. If the file needed by the sequencer is not already in ARB memory, the sequence cannot be initiated

	and an error will be generated. There is a blocking SCPI query which can be used to query if source list sequence being initiated successfully or not. (see "Query List Sequence Initiation Armed Status (Remote Command Only)" on page 895 Query Source List Sequence Armed Status)
Dependencies	Under the Sequence Analyzer Mode, if Meas Setup->Include Source is set to YES, Source->List Sequencer->Initiate Sequence is disabled.
Initial S/W Revision	A.05.00

List Sequencer Setup

Allows you access to the list sequencer setup menus.

Key Path	Source, List Sequencer

Number of Steps

Allows you to specify the number of steps within the list sequence.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:NUMBer:STEPs <integer>` `:SOURce:LIST:NUMBer:STEPs?`
Example	:SOUR:LIST:NUMB:STEP 1
Notes	Increasing the number of steps creates additional steps at the end of the list, with all the settings within the steps set to their default values. Decreasing the number of steps removes steps from the end of the list. The settings within the removed steps are not reset. This means that increasing the number of steps again would allow you to retrieve these steps.
Dependencies	The Step Count parameter is increased or decreased when you insert or delete a point from within the GUI interface to the sequencer.
Preset	1
Min	1
Max	1000
Initial S/W Revision	A.05.00

Current Step

Allows you to select the step number you wish to view or edit.

Key Path	Source, List Sequencer, List Sequencer Setup

Notes	No remote command, front panel only.
Preset	1
Min	1
Max	Step Count
Initial S/W Revision	A.05.00

Insert Step Before

Allows you to insert a new step, containing default values, before the currently selected step. Inserting a step will automatically increase the Step Count parameter by 1. If sequence already reaches upper limit of 1000 steps, then insert more step will be rejected and popup error –221, "Setting Conflict; Cannot insert more steps, maximum number of steps reached"

Key Path	Source, List Sequencer, List Sequencer Setup
Notes	No remote command, front panel only. If the list already contains the maximum limit of 1000 steps, no operation will be made after pressing this key.
Initial S/W Revision	A.05.00

Delete Step

Allows you to delete the current step. Deleting a step will automatically decrease the Step Count parameter by 1. If sequence only has one step left, delete step will be rejected and popup error –221, "Setting conflict; Cannot delete current step, minimum number of steps reached"

Key Path	Source, List Sequencer, List Sequencer Setup
Notes	No remote command, Front Panel key only. If the list already contains the minimum limit of 1 step, no operation will be made after pressing this key
Initial S/W Revision	A.05.00

Clear List

Allows you to clear the list. Clearing the list sets the number of steps to the default value of 1 and sets the parameters for the only step to their default values.

Key Path	Source, List Sequencer, List Sequencer Setup
Initial S/W Revision	A.05.00

Step Trigger

Allows access to the sub-menu for selecting the trigger input for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:INPut:TRIGger IMMediate | INTernal | EXTernal2 | KEY | BUS | EXTernal4` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:INPut:TRIGger?`
Example	:SOUR:LIST:STEP2:SET:INP:TRIG BUS :SOUR:LIST:STEP2:SET:INP:TRIG?
Notes	SCPI is supported after A.09.40
Preset	Free Run
Range	Free Run | Internal | Manual (Trigger Key) | Bus | External 2| EXTernal4
Initial S/W Revision	A.05.00

Free Run

Sets the trigger input for the current step to Free Run.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Trigger
Example	:SOUR:LIST:STEP2:SET:INP:TRIG IMM
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Internal

Sets the trigger input for the current step to Internal.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Trigger
Example	:SOUR:LIST:STEP2:SET:INP:TRIG INT
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Manual (Trigger Key)

Sets the trigger input for the current step to Manual (Trigger Key). Any step in the sequence set to Manual will cause the sequence execution to stop until the manual trigger key is pressed. Sending the Bus Trigger SCPI command will have no effect. At any point in the sequence where the list sequencer is paused waiting for a software trigger, a pop up dialog is displayed until the trigger event occurs.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Trigger
Example	:SOUR:LIST:STEP2:SET:INP:TRIG KEY
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Bus

Sets the trigger input for the current step to Bus. Any step in the sequence set to Bus will cause the sequence execution to stop until the Bus Trigger SCPI command is sent. Pressing the manual trigger key has no effect. At any point in the sequence where the list sequencer is paused waiting for a software trigger, a pop up dialog is displayed until the trigger event occurs.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Trigger
Example	:SOUR:LIST:STEP2:SET:INP:TRIG BUS
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

External 2

Sets the trigger input for the current step to External 2.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Trigger
Example	:SOUR:LIST:STEP2:SET:INP:TRIG EXT2
Notes	SCPI is supported after A.09.40
Notes	Note: When on E6640A, trigger 2 is a bi-directional trigger port. So when trigger 2 has been configured as OUTPUT type, choosing External 2 as the input trigger for the current step will generate error.
Initial S/W Revision	A.05.00

Transition Time

Allows you to specify the transition time for the current step.

The transition time is the amount of time allowed for the source to settle at the current frequency or amplitude value.

Transition Time should not be taken as additional time before or inside the Step Duration. You can set a value for the settling time to allow the source output frequency or amplitude to become stable. Make sure that during this period of time, you do not use the source output signal.

The following table lists recommended values for appropriate settling times to allow for changes within the source.

Value Changed	Recommended Transition Time
Frequency	500 µs
Amplitude	100 µs to within 0.1 dB 20 µs to within 1.0 dB

If the Transition Time value is shorter than the time necessary for the hardware to settle and a List Sequence is initiated, a warning is generated.

If the Transition Time value is longer than the Step Duration, an error is generated when initiating a source list sequence. For source list sequence, transition time is included in the step duration length. If the Transition Time value is longer than the Step Duration Time, the real step duration length is extended to equal the transition time and cause a timing shift.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:TRANsition:TIME <time>` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:TRANsition:TIME?`
Example	:SOUR:LIST:STEP2:SET:TRAN:TIME 1ms :SOUR:LIST:STEP2:SET:TRAN:TIME?
Notes	SCPI is supported after A.09.40
Preset	1.0 ms
Min	0.0 ms
Max	4.0 ks
Initial S/W Revision	A.05.00

Radio Setup

Allows you access to the sub-menus for setting up the radio standard, band, and radio band link direction for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup
Notes	No remote command, front panel only.
Initial S/W Revision	A.05.00

Radio Standard

Allows access to the sub-menus for selecting the radio standard and the associated radio band for use in the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:RADio:BAND NONE | PGSM | EGSM | RGSM | DCS1800 | PCS1900 | TGSM810 | GSM450 | GSM480 | GSM700 | GSM850 | BANDI | BANDII | BANDIII | BANDIV | BANDV | BANDVI | BANDVII | BANDVIII | BANDIX | BANDX | BANDXI | BANDXII | BANDXIII | BANDXIV | BANDXIX | USCELL | USPCS | JAPAN | KOREAN | NMT | IMT2K | UPPER | SECOND | PAMR400 | PAMR800 | IMTEXT | PCS1DOT9G | AWS | US2DOT5G | PUBLIC | LOWER | NONE | BAND1 | BAND2 | BAND3 | BAND4 | BAND5 | BAND6 | BAND7 | BAND8 | BAND10 | BAND11 | BAND12 | BAND13 | BAND14 | BAND17 | BAND18 | BAND19 | BAND20 | BAND21 | BAND24 | BAND25 | BAND26 | BAND27 | BAND28 | BAND31 | BAND33 | BAND34 | BAND35 | BAND36 | BAND37 | BAND38 |`

	BAND39 | BAND40 | BAND41 | BAND42 | BAND43 | BAND44 | BANDA | BANDB | BANDC | BANDD | BANDE | BANDF :SOURce:LIST:STEP[1]|2|3…1000:SETup: RADio:BAND?
Example	:SOUR:LIST:STEP2:SET:RAD:BAND PGSM :SOUR:LIST:STEP2:SET:RAD:BAND?
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

None

Selects no radio standard for use on the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard
Example	:SOUR:LIST:STEP2:SET:RAD:BAND NONE
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

GSM/EDGE

Pressing this key once selects GSM/EDGE as the radio standard and the current GSM/EDGE band as the active channel band. Pressing this key again allows access to the sub-menus for selecting a different GSM/EDGE band.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard
Initial S/W Revision	A.05.00

P-GSM

Selects P-GSM as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

E-GSM

Selects E-GSM as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

R-GSM

Selects R-GSM as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

DCS 1800

Selects DCS 1800 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

PCS 1900

Selects PCS 1900 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

GSM 450

Selects GSM 450 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

GSM 480

Selects GSM 480 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

GSM 850

Selects GSM 850 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

GSM 700

Selects GSM 700 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

T-GSM 810

Selects T-GSM 810 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

WCDMA

Pressing this key once selects WCDMA as the radio standard and the current WCDMA band as the active channel band. Pressing this key again allows access to the sub-menus for selecting a different WCDMA band.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard
Initial S/W Revision	A.05.00

Band I

Selects Band I as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band II

Selects Band II as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band III

Selects Band III as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band IV

Selects Band IV as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band V

Selects Band V as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band VI

Selects Band VI as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band VII

Selects Band VII as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band VIII

Selects Band VIII as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band IX

Selects Band IX as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band X

Selects Band X as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band XI

Selects Band XI as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band XII

Selects Band XII as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band XIII

Selects Band XIII as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band XIV

Selects Band XIV as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band XIX

Selects Band XIX as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.14.50

CDMA 2000 / 1xEVDO

Pressing this key once selects CDMA 2000/1xEVDO as the radio standard and the current CDMA 2000/1xEVDO band as the active channel band. Pressing this key again allows access to the sub-menus for selecting a different CDMA 2000/1xEVDO band.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard
Initial S/W Revision	A.05.00

US CELL

Selects US Cell as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

US PCS

Selects US PCS as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

Japan Cell

Selects Japan Cell as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

Korean PCS

Selects Korean PCS as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

NMT 450

Selects NMT 450 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

IMT 2000

Selects IMT 2000 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

Upper 700

Selects Upper 700 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

Secondary 800

Selects Secondary 800 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

400 Euro PAMR

Selects 400 Euro PAMR as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

800 PAMR

Selects 800 PAMR as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

2.5GHz IMT EXT

Selects 2.5 GHz IMT EXT as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

US PCS 1.9GHz

Selects US PCS 1.9 GHz as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

AWS

Selects AWS as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

US 2.5GHz

Selects US 2.5 GHz as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

700 Public Safety

Selects 700 Public Safety as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

C2K Lower 700

Selects C2K Lower 700 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

LTE

Pressing this key once selects LTE FDD as the radio standard and the current LTE FDD band as the active channel band. Pressing this key again allows access to the sub-menus for selecting a different LTE FDD band.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard
Initial S/W Revision	A.09.50

BAND 1

Selects BAND 1 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 2

Selects BAND 2 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 3

Selects BAND 3 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 4

Selects BAND 4 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 5

Selects BAND 5 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 6

Selects BAND 6 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 7

Selects BAND 7 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 8

Selects BAND 8 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 9

Selects BAND 9 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 10

Selects BAND 10 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 11

Selects BAND 11 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 12

Selects BAND 12 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 13

Selects BAND 13 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 14

Selects BAND 14 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 17

Selects BAND 17 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 18

Selects BAND 18 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 19

Selects BAND 19 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 20

Selects BAND 20 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 21

Selects BAND 21 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 24

Selects BAND 24 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 25

Selects BAND 25 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 26

Selects BAND 26 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.12.53

BAND 27

Selects BAND 27 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.14.00

BAND 28

Selects BAND 28 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.14.00

BAND 31

Selects BAND 31 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.14.00

LTE TDD

Sets LTE TDD as the radio standard for use and accesses the LTE TDD specific channel band sub-menus..

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.11.50

BAND 33

Selects BAND 33 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND33
Initial S/W Revision	A.11.50

BAND 34

Selects BAND 34 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND34
Initial S/W Revision	A.11.50

BAND 35

Selects BAND 35 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND35
Initial S/W Revision	A.11.50

BAND 36

Selects BAND 36 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND36
Initial S/W Revision	A.11.50

BAND 37

Selects BAND 37 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND37
Initial S/W Revision	A.11.50

BAND 38

Selects BAND 38 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND38
Initial S/W Revision	A.11.50

BAND 39

Selects BAND 39 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND39
Initial S/W Revision	A.11.50

BAND 40

Selects BAND 40 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND40
Initial S/W Revision	A.11.50

BAND 41

Selects BAND 41 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND41
Initial S/W Revision	A.11.50

BAND 42

Selects BAND 42 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND42
Initial S/W Revision	A.11.50

BAND 43

Selects BAND 43 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND43
Initial S/W Revision	A.11.50

BAND 44

Selects BAND 44 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE TDD
Initial S/W Revision	A.14.00

TDSCDMA

Sets TDSCDMA as the radio standard for use and accesses the TDSCDMA specific channel band sub-menus..

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.11.50

BAND A

Selects BAND A as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDA
Initial S/W Revision	A.11.50

BAND B

Selects BAND B as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDB
Initial S/W Revision	A.11.50

BAND C

Selects BAND C as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDC
Initial S/W Revision	A.11.50

BAND D

Selects BAND D as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDD
Initial S/W Revision	A.11.50

BAND E

Selects BAND E as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA

Example	:SOUR:FREQ:CHAN:BAND BANDE
Initial S/W Revision	A.11.50

BAND F

Selects BAND F as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDF
Initial S/W Revision	A.11.50

Radio Band Link

Allows you to specify the radio band link direction for the steps within the list sequence. The link is used in conjunction with the channel band and channel number to determine the output frequency.

When set to “Uplink”, the source will calculate the uplink frequency according to an uplink formula together with selected channel band and channel number. When set to “Downlink”, the source will calculate the downlink frequency according to a downlink formula together with selected channel band and channel number.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:RADio:BAND:LINK DOWN|UP` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:RADio:BAND:LINK?`
Example	:SOUR:LIST:STEP2:SET:RAD:BAND:LINK UP :SOUR:LIST:STEP2:SET:RAD:BAND:LINK?
Notes	SCPI is supported after A.09.40
Preset	DOWN
Range	DOWN | UP
Initial S/W Revision	A.05.00

Channel

Allows you to specify the frequency of the current step via a channel number.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:CNFRequency <double>` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:CNFRequency?`
Example	:SOUR:LIST:STEP2:SET:CNFR 124 :SOUR:LIST:STEP2:SET:CNFR?
Notes	SCPI is supported after A.09.40.

	This SCPI is used to setup channel number or frequency setting, according to current Radio Band setting. If Radio Band is “NONE”, then it’s frequency. If Radio Band is not “NONE”, then it’s channel number.
Couplings	The channel number is coupled to the step frequency value. When the step frequency value is changed, the channel number will increase or decrease to match the new step frequency. If the step frequency is not at an exact match for a channel number, the nearest channel number is displayed, along with a greater than, or less than sign to indicate the frequency is above or below the channel number.
Preset	1
Min	0 (Please refer to for valid ranges.)
Max	10838 (Please refer to for valid ranges.)
Initial S/W Revision	A.05.00

Frequency

Allows you to specify a frequency value for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:CNFRequency <double>` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:CNFRequency?`
Example	:SOUR:LIST:STEP2:SET:CNFR 1GHz :SOUR:LIST:STEP2:SET:CNFR?
Notes	SCPI is supported after A.09.40. This SCPI is used to setup channel number or frequency setting, according to current Radio Band setting. If Radio Band is “NONE”, then it’s frequency. If Radio Band is not “NONE”, then it’s channel number.
Couplings	The frequency value is coupled to the channel band and number for the step, such that updates to the radio band and channel number will update the frequency value to the corresponding absolute frequency. The reverse is also true, changing the frequency value causes the value of the channel number to be updated.
Preset	1.00 GHz
Min	10.00 MHz
Max	Hardware Dependant: Option 503 = 3.6 GHz Option 504 = 3.9 GHz Option 506 = 6.00 GHz
Initial S/W Revision	A.05.00

Power

Allows you to specify a power value for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:AMPLitude <double>` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:AMPLitude?`
Example	:SOUR:LIST:STEP2:SET:AMPL –50dBm :SOUR:LIST:STEP2:SET:AMPL?
Notes	SCPI is supported after A.09.40
Notes	Amplitude corrections can be specified for use with the source. In the event of amplitude corrections being applied, the valid ranges for the RF power do not change dependant on the current amplitude correction setting. Instead, if the combination of RF power + amplitude correction is higher or lower than the source output range, the Source Unleveled bit is set and the “Source Unleveled” indicator will appear on status panel to indicate that the source cannot maintain the output power that has been requested. The multiport adapter RFIO TX ports and GPS ports cannot ensure power accuracy when power setting is lower than –130dBm, this power setting value is defined by the sum of RF Power setting and related amplitude correction value. But user settable value could be lower than this limit. When application detected there exists power setting lower than –130dBm on MPA RFIO TX ports, then popup warning message . When application detected there exists power setting lower than –130dBm on MPA GPS ports, then popup warning message . These are only warning messages, and check is performed when RF is ON.
Notes	The Min and Max value here defined UI settable amplitude range. This range is larger than actual amplitude range with level accuracy defined in spec.
Dependencies	The RF power is dependent on the RF output port and frequency, such that the current frequency and selected output port determine the valid range of power values.
Preset	–100 dBm
Min	The range of values depends on the current frequency and selected RF output port. Please refer to "RF Power" on page 772 and the table RF Power Range for the valid ranges.
Max	The range of values depends on the current frequency and selected RF output port. Please refer to "RF Power" on page 772 and the table RF Power Range for the valid ranges.
Initial S/W Revision	A.05.00

Waveform

Allows you access to the sub-menus for selecting the waveform to be played back during the current step. Pressing this key also changes the central display area to show the Waveform File Selection view.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:WAVeform <string>` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:WAVeform?`
Example	:SOUR:LIST:STEP2:SET:WAV “CW” :SOUR:LIST:STEP2:SET:WAV?
Notes	SCPI is supported after A.09.40
Remote Command Notes	String type, takes “Off” | “CW” | “Cont” | “waveform name”

Preset	CW
Range	Waveform | Continue Previous | CW | Off
Initial S/W Revision	A.05.00

CW

Sets the current step to output a CW tone.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform
Example	:SOUR:LIST:STEP2:SET:WAV “CW”
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Selected Waveform

Inserts the currently selected waveform in the waveform selection view as the waveform for playback during the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform
Example	:SOUR:LIST:STEP2:SET:WAV “waveform name”
Notes	SCPI is supported after A.09.40 If the selected waveform contains header (which contains ARB play parameters), source list sequence will automatically apply header settings of the selected waveform in that step.
Initial S/W Revision	A.05.00

Continue Previous

Sets the current step to continue with playback of the waveform from the previous step. When continuing the previous waveform, the ARB playback will not pause while the source retunes to the new frequency or amplitude that may be defined for the new step.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform
Example	:SOUR:LIST:STEP2:SET:WAV “Cont”
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Off

Disable RF outpu of the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform
Example	:SOUR:LIST:STEP2:SET:WAV “Off”
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Segments on Hard Disk

Allows you access to the sub-menus for loading waveform segments from the hard disk into ARB memory. The default directory is: D: varb.

Pressing this key changes the current view to the Waveform Management View.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Initial S/W Revision	A.05.00

Load Segment To ARB Memory

Allows you to load the selected file into ARB memory. On the front panel you select the file for loading to the ARB memory by highlighting the desired file in the list. Using the SCPI command, you specify the file name on the HDD.

“NVWFM” (none-volatile storage) MSUS (Mass Storage Unit Specifier) is supported in the memory subsystem because the ARB memory cannot be accessed directly. Therefore, files must be downloaded to the instrument hard disk and then loaded into the ARB memory. “NVWFM” MSUS will be mapped to the default directory D: VARB. The SCPI command supports using either “NVWFM” MSUS or specifying a full path. For more information, see Memory Subsystem (Remote Command Only).

If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MMEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:LOAD <string>`
Example	:SOUR:RAD:ARB:LOAD “D: VARB\testwaveform.bin” or :SOUR:RAD:ARB:LOAD “NVWFM:testwaveform.bin”
Notes	Because loading the file involves a delay of unpredictable length, this command should be followed by the query *OPC?, which holds off subsequent commands until the loading operating is complete. <string> – specifies the path name of the file to load from the HDD into ARB memory. It could be a <full path + filename>, or <“NVWFM” MSUS + colon + filename>.

	When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load a file to ARB memory will be rejected with an error. When Include Source is Noand if there is insufficient free ARB memory to load the selected waveform, an error is generated. . If you specify a file over SCPI, but the file is not at the specified location, an error is generated. If you try to load a waveform file but the file contains less than 500 IQ sampes, an error is generated. If you try to load a Signal Studio waveform "*.wfm" which contains invalid waveform header, an error is generated. If the ARB is ON when you load afile to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished. ARB can be loaded into ARB memory even required licenses do not present on the instrument. In this case, a GUI only warning message –800, "Operation complete; Loaded <filename> successfully, but no license <required licenses> installed". User can install required licenses according to <required licenses> string to license it, or multi-pack license it.
Initial S/W Revision	A.05.00

Load All To ARB Memory

Allows you to load all the segment files within the currently selected directory into ARB memory. If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:LOAD:ALL <string>`
Example	:SOUR:RAD:ARB:LOAD:ALL "D: varb"
Notes	<string> - specifies the directory on the HDD to load the files into ARB memory from. When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load all files from a directory to ARB memory is rejected with an error. When Include Source is No and there is insufficient free ARB memory to load all the waveforms, when the ARB memory is full, the copy ceases, and an error is generated. If you specify a directory over SCPI, but the directory does not exist, an error is generated. If the ARB is ON, a user then loads or deletes file to ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Change Directory...

Allows you to change the currently selected directory on the hard disk. Pressing this key opens a standard windows change directory dialog allowing you to select the new directory of interest.

The current directory is used for manually loading waveform segments into ARB memory for playback, and as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence or a list sequence.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Notes	No remote command, SCPIfront panel only.
Initial S/W Revision	A.05.00

Default Directory...

Allows you to change the default directory. It is used as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence, and as a search location for selecting waveforms using SCPI.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:DEFault:DIRectory <string>` `:SOURce:RADio:ARB: DEFault:DIRectory?`
Example	:SOUR:RAD:ARB:DEF:DIR “D:\ArbFiles” :SOUR:RAD:ARB:DEF:DIR?
State Saved	Persistent, survives a power cycle and a preset but not saved in the instrument state
Initial S/W Revision	A.05.00

Segments in ARB Memory

Allows you access to the sub-menus for managing the files within ARB memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Initial S/W Revision	A.05.00

Delete Segment From ARB Mem

Allows you to remove a segment from ARB playback memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments in ARB Memory
Remote Command	`:SOURce:RADio:ARB:DELete <string>`
Example	:SOUR:RAD:ARB:DEL “testwaveform.bin”
Notes	<string> - specifies the waveform to be deleted from the ARB playback memory. When in Sequence Analyzer mode and Include Source is Yes, an attempt to delete a file from ARB

	memory is rejected with an error. When Include Source is No and you specify a file that does not exist within ARB memory, an error is generated. It is possible to delete files from within the ARB memory when the ARB is ON. However, if you attempt to delete the file that is currently playing an error is generated. It is possible to delete a file from within the ARB memory when the sequencer state is ON and the file is not being used by the List Sequencer. If you attempt to delete a file which is being used by the list sequencer, an error is generated. When sequencer state is On, even if ARB state is On, the selected waveform will not be played. In this case, if the selected waveform is not used in List Sequence, it can be deleted and the ARB state is turned Off. If the ARB is ON and you load a file to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Delete All From ARB Memory

Allows you to remove all segments from ARB playback memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments in ARB Memory
Remote Command	`:SOURce:RADio:ARB:DELete:ALL`
Example	:SOUR:RAD:ARB:DELete:ALL
Notes	When in Sequence Analyzer mode and Include Source is Yes, an attempt to delete all files from ARB memory is rejected with an error. When Include Source is No and you attempt to delete all files from ARB memory when the ARB is currently playing a file, all files except the one playing are deleted and an error is generated. If you attempt to delete all files from ARB memory when there are waveform files used in "List Sequencer" on page 850 and "Sequencer" on page 851 state is ON, all files except the files currently being used in list sequencer are deleted, and an error is generated. If the ARB is ON and you load a file to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Segments on Hard Disk

This key functions the same as "Segments on Hard Disk" on page 877.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform
Initial S/W Revision	Prior to A.09.00

Load Segment To ARB Memory

This key functions the same as "Load Segment To ARB Memory" on page 877.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Load All To ARB Memory

This key functions the same as "Load All To ARB Memory" on page 878.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Change Directory ...

This key functions the same as "Change Directory..." on page 879.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Default Directory ...

This key functions the same as "Default Directory..." on page 879

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Segments in ARB Memory

This key functions the same as "Segments in ARB Memory" on page 879.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform, Segments in ARB Memory
Initial S/W Revision	Prior to A.09.00

Delete Segment From ARB Memory

This key functions the same as "Delete Segment From ARB Mem" on page 879.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform, Segments in ARB Memory, Segment in ARB Memory
Initial S/W Revision	Prior to A.09.00

Delete All From ARB Memory

This key functions the same as "Delete All From ARB Memory" on page 880.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform, Segments in ARB Memory, Segment in ARB Memory
Initial S/W Revision	Prior to A.09.00

Step Duration

Allows access to the sub-menus for setting up the duration of play for the current step.

The duration can be set to be either the number of times for the ARB file associated with the sequence to play, or a specific time value, or continuous. If the step is set to play a CW tone, the step duration cannot be set to a play count.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:DURation:TYPE TIME | COUNt | CONTinuous | CABort` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:DURation:TYPE?`
Example	:SOUR:LIST:STEP2:SET:DUR:TYPE TIME :SOUR:LIST:STEP2:SET:DUR:TYPE?
Notes	SCPI is supported after A.09.40
Notes	If “Step Duration” is set to “Time” or “Play Count” for the last step, the last step of ARB keeps playing as if set to “Continuous”, until the set “Time” has expired or until the “Play Count” setting is reached. However, you can query Error! Reference source not found. Source Sweeping Condition Message to find out if the current list sequence is complete or not.
Range	Time | Play Count | Continuous | Continuous Abort
Initial S/W Revision	A.05.00

Time

Sets the duration of the current step to be a time value for the length of time the step will play. Pressing this key again opens another menu which allows you to set the time value for the step duration.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Duration
Example	:SOUR:LIST:STEP2:SET:DUR:TYPE TIME
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Duration Time

Allows you to specify the length of time the current step will play.

When Step Duration is Continuous Abort this parameter specifies the maximum duration that the waveform will continue to play after a step trigger is received before the transition to the next waveform will occur. Duration is limited to a maximum of 20 seconds.

If the Transition Time value is longer than the Step Duration Time, an error is generated when initiating a source list sequence. For source list sequence, transition time is included in the step duration length (not occupy additional time). If the Transition Time value is longer than the Step Duration Time, the real step duration length is extended to equal the transition time and cause a timing shift. This check is also described in section Error! Reference source not found. List Sequence Step Validation.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Duration, Time
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:DURation:TCOunt <double>` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:DURation:TCOunt?`
Example	:SOUR:LIST:STEP2:SET:DUR:TCO 1s :SOUR:LIST:STEP2:SET:DUR:TCO?
Notes	SCPI is supported after A.09.40 This SCPI is reused by “Play Count” ,“Duration Time” and “Continuous Abort” according to current Duration Type setting is “Play Count” or “Duraton Time” or “Continuous Abort”. If current “Duration Type” is “Continuous”, then popup error –221,"Settings conflict;Cannot accept time or count input when step duration type is Continuous on step #"
Notes	If “Duration Time” is set for the last step, the last step of ARB keeps playing as if set to “Continuous” after set time expires. However, you can query Source Sweeping Condition Message (:STAT:OPER:COND?) to find out if the current list sequence is complete or not.
Preset	1.00 ms
Min	100 µs
Max	1800 s
Initial S/W Revision	A.05.00

Play Count

Sets the duration of the current step to be an integer value for the number of times (play count) the ARB file is selected for playback during this step. For example, a 5 second ARB will be set to play 5 times during the step.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Duration
Example	:SOUR:LIST:STEP2:SET:DUR:TYPE COUN
Notes	SCPI is supported after A.09.40 This key is unavailable and is grayed out if the current step is configured to CW tone rather than an ARB waveform.
Initial S/W Revision	A.05.00

Header Utilities

Allows access to the header utilities sub-menu. Pressing this key also causes the central display area to change to display the File Header Information view.

Key Path	Source, Modulation Setup, ARB
Dependencies	This key is only available if there is currently a waveform selected for playback. If no waveform is selected, the key is grayed out.
Initial S/W Revision	A.05.00

Continuous

Sets the current step to be played continuously until the next step starts. The waveform will always play completely before transitioning to the next step.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Duration
Example	:SOUR:LIST:STEP2:SET:DUR:TYPE CONT
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Output Trigger

Allows you to specify the trigger output for the current step. The trigger output signal is sent at the start of the step.

When select “On”, trigger event will occur on both Internal and External2 paths. Select “Off” will turn off trigger output.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:OUTPut:TRIGger ON | OFF | 1 | 0` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:OUTPut:TRIGger`
Example	:SOUR:LIST:STEP2:SET:OUTP:TRIG ON :SOUR:LIST:STEP2:SET:OUTP:TRIG?
Notes	SCPI is supported after A.09.40
Preset	Off
Range	On|Off
Initial S/W Revision	A.05.00

Step Configuration (Remote Command Only)

This SCPI command is used to configure the List Sequencer and is detailed in the table below. The command is defined such that you send one command per step, with the step number being specified as a subopcode of the SCPI command. Each command includes all the parameter settings for the step. As a step is setup, the values entered are run through several levels of validation.

Remote Command	`:SOURce:LIST:STEP[1]|2|...|4..1000:SETup IMMediate | INTernal | KEY |`

	BUS | EXTernal2, <time>, NONE | PGSM | EGSM | RGSM | DCS1800 | PCS1900 | TGSM810 | GSM450 | GSM480 | GSM700 | GSM850 | BANDI | BANDII | BANDIII | BANDIV | BANDV | BANDVI | BANDVII | BANDVIII | BANDIX | BANDX | BANDXI | BANDXII | BANDXIII | BANDXIV | BANDXIX | USCELL | USPCS | JAPAN | KOREAN | NMT | IMT2K | UPPER | SECOND | PAMR400 | PAMR800 | IMTEXT | PCS1DOT9G | AWS | US2DOT5G | PUBLIC | LOWER | NONE | BAND1 | BAND2 | BAND3 | BAND4 | BAND5 | BAND6 | BAND7 | BAND8 | BAND10 | BAND11 | BAND12 | BAND13 | BAND14 | BAND17 | BAND18 | BAND19 | BAND20 | BAND21 | BAND24 | BAND25 | BAND26 | BAND33 | BAND34 | BAND35 | BAND36 | BAND37 | BAND38 | BAND39 | BAND40 | BAND41 | BAND42 | BAND43 | BANDA | BANDB | BANDC | BANDD | BANDE | BANDF, DOWN | UP, <freq>, <ampl>, <string>, TIME | COUNt | CONTinuous, <time>, ON | OFF | 1 | 0, [<int>], :SOURce:LIST:STEP[1]|2|...|4..1000:SETup?
Example	:SOUR:LIST:STEP1:SET INT, 1ms, PGSM, DOWN, 10, –25 dBm, “GSM_Test1.bin”, TIME, 10ms, OFF, 255
Notes	The parameters are: (There is a total of 11 items in each step, the following is a list of the items in the order they must appear in the remote command.) 1. Step Trigger <**enum**> – specifies the input trigger for the step. For details of the valid types of step trigger see "Step Trigger" on page 853. 2. Transition Time <**time**> – specifies the transition time for the stepin seconds. For details of the valid ranges for the transition time see "Transition Time" on page 855. 3. Radio Band <**enum**> – specifies the radio band for the step. For details of the valid radio bands see "Radio Setup" on page 856. 4. Radio Band Link <**enum**> – specifies the radio band link direction for the step. For details of the valid link types, see "Radio Band Link" on page 873. 5. Frequency/Channel Number <**freq**>/<chan num> – specifies the frequency in Hz or the channel number for the step. The channel number and frequency are combined as one parameter that represents the frequency or channel number depending on the radio band setting. If the radio band is set to NONE, this value is interpreted as a frequency value in Hz. If the radio band is set to a valid band, this value is interpreted as a channel number. For details of the valid ranges for frequency and channel numbers, see "Channel" on page 873 and "Frequency" on page 874 . 6. Power <**ampl**> – specifies the output power for the step in dBm. For details of the valid ranges see "Power" on page 874. 7. Waveform <**string**> – specifies the waveform for playback during the step. The step can output either a new ARB waveform, continue playback of the previous waveform, or output a CW tone. The options for specifying these are: <filename> - plays the specified waveform from the start. The filename value is the name of the file within ARB playback memory, it is does not include the windows path to the file on the HDD. If you enter a filename for a waveform that does not reside within ARB playback memory, an error is generated. CONT – continues playback of the ARB file from the previous step CW – outputs a CW tone OFF – disable RF output 8. Step Duration <**enum**> – specifies the duration of the step. The duration can be specified to be either time, or play count of the ARB file associated with the step, or continuous. If Waveform is set to “CW”, this value cannot be set to Play Count and an error will be generated. If continuous is selected, the following Time or Count value is ignored. For further details of this setting, see "Step

	Duration" on page 882. 9. Time or Count <time/int> – specifies time duration in seconds or play count of the ARB file associated with the step. For further details of this setting, including the valid ranges for the time or play count setting, "Time" on page 882 and "Play Count" on page 883. 10. Output Trigger <Boolean> – specifies the output trigger for the step. For details of the ranges for this setting see "Output Trigger" on page 884.
Dependencies	The range of subopcode values is 1 to 1000 and the value you enter is determined by the number of steps you have configured. For details see "Number of Steps" on page 852. If you attempt to remotely set or query a subopcode that is out of range, an error is generated.
Initial S/W Revision	A.05.00

Step Configuration of Step Trigger parameter list (Remote Command Only)

This SCPI command is to configure “Step Trigger” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:INPut:TRIGger <enum>, <enum>, <enum>, …` `:SOURce:LIST:SETup:INPut:TRIGger?`
Example	:SOUR:LIST:SET:INP:TRIG IMM,INT,EXT2 :SOUR:LIST:SET:INP:TRIG?
Notes	The command is to setup below parameter array of whole list sequence. Step Trigger <**enum**> – specifies the input trigger for the step. For details of the valid types of step trigger see "Step Trigger" on page 853. If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in number of steps will be updated.
Remote Command Notes	IMMediate|INTernal|KEY|BUS|EXTernal2
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Transition Time parameter list (Remote Command Only)

This SCPI command is to configure “Transition Time” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:TRANsition:TIME <time>, <time>, <time>, …` `:SOURce:LIST:SETup:TRANsition:TIME?`
Example	:SOUR:LIST:SET:TRAN:TIME 1ms,1ms,1ms

	:SOUR:LIST:SET:TRAN:TIME?
Notes	The command is to setup below parameter array of whole list sequence. Transition Time <**time**> – specifies the transition time for the stepin seconds. For details of the valid ranges for the transition time see "Transition Time" on page 855 If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in number of steps will be updated.
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Radio Band parameter list (Remote Command Only)

This SCPI command is to configure “Radio Band” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:RADio:BAND <enum>, <enum>, <enum>, …` `:SOURce:LIST:SETup:RADio:BAND?`
Example	:SOUR:LIST:SET:RAD:BAND PGSM, EGSM, RGSM :SOUR:LIST:SET:RAD:BAND?
Notes	The command is to setup below parameter array of whole list sequence. Radio Band <**enum**> – specifies the radio band for the step. For details of the valid radio bands see "Radio Setup" on page 856. If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in number of steps will be updated.
Rem	NONE|PGSM|EGSM|RGSM|DCS1800|PCS1900|TGSM810|GSM450|GSM480|GSM700|GSM850|BANDI|BANDII|BANDIII|BANDIV|BANDV|BANDVI|BANDVII|BANDVIII|BANDIX|BANDX|BANDXI|BANDXII|BANDXIII|BANDXIV|BANDXIX|USCELL|USPCS|JAPAN|KOREAN|NMT|IMT2K|UPPER|SECOND|PAMR400|PAMR800|IMTEXT|PCS1DOT9G|AWS|US2DOT5G|PUBLIC|LOWER|NONE|BAND1|BAND2|BAND3|BAND4|BAND5|BAND6|BAND7|BAND8|BAND10|BAND11|BAND12|BAND13|BAND14|BAND17|BAND18|BAND1

Note	9|BAND20|BAND21|BAND24|BAND25|BAND26|BAND33|BAND34|BAND35|BAND36|BAND37|BAND38|BAND39|BAND40|BAND41|BAND42|BAND43|BANDA|BANDB|BANDC|BANDD|BANDE|BANDF
Command Notes	
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Radio Band Link parameter list (Remote Command Only)

This SCPI command is to configure “Radio Band Link” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:RADio:BAND:LINK <enum>, <enum>, <enum>, …` `:SOURce:LIST:SETup:RADio:BAND:LINK?`
Example	:SOUR:LIST:SET:RAD:BAND:LINK DOWN,UP,UP :SOUR:LIST:SET:RAD:BAND:LINK?
Notes	The command is to setup below parameter array of whole list sequence. Radio Band Link <**enum**> – specifies the radio band link direction for the step. For details of the valid link types, see "Radio Band Link" on page 873. If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in number of steps will be updated.
Remote Command Notes	DOWN|UP
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Frequency/Channel Number parameter list (Remote Command Only)

This SCPI command is to configure “Frequency” or “Channel Number” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:CNFRequency <double>, <double>, <double>, …` `:SOURce:LIST:SETup:CNFRequency?`
Example	:SOUR:LIST:SET:CNFR 1GHz,100MHz,100MHz :SOUR:LIST:SET:CNFR? SOUR:LIST:SET:CNFR 124,124,124 :SOUR:LIST:SET:CNFR?
Notes	The command is to setup below parameter array of whole list sequence. Frequency/Channel Number <**freq**>/<chan num> – specifies the frequency in Hz or the channel number for the step. The channel number and frequency are combined as one parameter that represents the frequency or channel number depending on the radio band setting. If the radio band is set to NONE, this value is interpreted as a frequency value in Hz. If the radio band is set to a valid band, this value is interpreted as a channel number. For details of the valid ranges for frequency and channel numbers, see "Channel" on page 873 and "Frequency" on page 874 This SCPI is used to setup/query channel number or frequency setting, according to current Radio Band setting of that step. If Radio Band is “NONE”, then it’s frequency. If Radio Band is not “NONE”, then it’s channel number If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in

	legal step number will be updated.
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Power parameter list (Remote Command Only)

This SCPI command is to configure “Power”parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:AMPLitude <ampl>, <ampl>, <ampl>, …` `:SOURce:LIST:SETup:AMPLitude?`
Example	:SOUR:LIST:SET:AMPL –50dBm,–40dBm,–30dBm :SOUR:LIST:SET:AMPL?
Notes	The command is to setup below parameter array of whole list sequence. Power <**ampl**> – specifies the output power for the step in dBm. For details of the valid ranges see "Power" on page 874. If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in legal step number will be updated.
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Waveform parameter list (Remote Command Only)

This SCPI command is to configure “Waveform” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:WAVeform <string>, <string>, <string>, …` `:SOURce:LIST:SETup:WAVeform?`
Example	:SOUR:LIST:SET:WAV “CW”,”Off”,”CONT” :SOUR:LIST:SET:WAV?
Notes	The command is to setup below parameter array of whole list sequence. Waveform <**string**> – specifies the waveform for playback during the step. The step can output either a new ARB waveform, continue playback of the previous waveform, or output a CW tone. The options for specifying these are: <filename> - plays the specified waveform from the start. The filename value is the name of the file within ARB playback memory, it is does not include the windows path to the file on the HDD. If you enter a filename for a waveform that does not reside within ARB playback memory, an error is generated.

	CONT – continues playback of the ARB file from the previous step CW – outputs a CW tone OFF – disable RF output If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in number of steps will be updated.
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Range	”filename” | “CW” | “Off” | “CONT”
Initial S/W Revision	A.09.40

Step Configuration of Step Duration parameter list (Remote Command Only)

This SCPI command is to configure “Step Duration” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:DURation:TYPE <enum>, <enum>, <enum>, …` `:SOURce:LIST:SETup:DURation:TYPE?`
Example	:SOUR:LIST:SET:DUR:TYPE COUN,TIME,CONT :SOUR:LIST:SET:DUR:TYPE?
Notes	The command is to setup below parameter array of whole list sequence. Step Duration <**enum**> – specifies the duration of the step. The duration can be specified to be either time, or play count of the ARB file associated with the step, or continuous. If Waveform is set to “CW”, this value cannot be set to Play Count and an error will be generated. If continuous is selected, the following Time or Count value is ignored. For further details of this setting, see "Step Duration" on page 882. If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in number of steps will be updated.
Remote Command Notes	TIME | COUNt | CONTinuous
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Duration Time or Play Count parameter list (Remote Command Only)

This SCPI command is to configure “Duration Time” or “Play Count” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:TOCount <time/int>, <time/int>, <time/int>, …` `:SOURce:LIST:SETup:TOCount?`

Example	:SOUR:LIST:SET:TOC 1s,2s,3s :SOUR:LIST:SET:TOC? :SOUR:LIST:SET:TOC 5,6,7 :SOUR:LIST:SET:TOC?
Notes	The command is to setup below parameter array of whole list sequence. Time or Count <time/int> – specifies time duration in seconds or play count of the ARB file associated with the step. For further details of this setting, including the valid ranges for the time or play count setting, "Time" on page 882 and "Play Count" on page 883. If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in number of steps will be updated. If current "Step Duration" on page 882 is “Continuous”, then generate error –221,"Settings conflict;Cannot accept time or count input when step duration type is Continuous on step #"
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Output Trigger parameter list (Remote Command Only)

This SCPI command is to configure “Output Trigger”parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:OUTPut:TRIGger <bool>, <bool>, <bool>, …` `:SOURce:LIST:SETup:OUTPut:TRIGger ?`
Example	:SOUR:LIST:SET:OUTP:TRIG ON,OFF,ON :SOUR:LIST:SET:OUTP:TRIG?
Notes	The command is to setup below parameter array of whole list sequence. Output Trigger <Boolean> – specifies the output trigger for the step. For details of the ranges for this setting see "Output Trigger" on page 884. If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in legal step number will be updated.
Remote Command Notes	ON|OFF|1|0
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Clear List (Remote Command Only)

This command is the SCPI equivalent of the Clear List UI featuredescribed in.

Remote Command	`:SOURce:LIST:SETup:CLEar`
Example	:SOUR:LIST:SETup:CLE
Initial S/W Revision	A.05.00

Trigger Type

Allows access to the sub-menu for selecting the output trigger type for the list sequencer globally. It cannot be changed between different sequence steps.

Key Path	Source, List Sequencer
Remote Command	`:SOURce:LIST:TRIGgerout:TYPe BEGinningofstep|DATamarker`
Example	:SOUR:LIST:TRIG:TYP BEG :SOUR:LIST:TRIG:TYP?
Notes	SCPI is supported after A.14.00
Preset	BEGinningofstep
Range	BEGinningofstep|DATamarker
Initial S/W Revision	A.14.00

BeginningOfStep

Sets the output trigger type as BeginningOfStep for the whole source sequence.

Key Path	Source, List Sequencer, Trigger Type
Example	:SOUR:LIST:TRIG:TYP BEG
Notes	SCPI is supported after A.14.00
Initial S/W Revision	A.14.00

DataMarker

Sets the output trigger type as DataMarker for the whole source sequence. When DataMarker is selected, which marker to route is also needed to be set.

Key Path	Source, List Sequencer, Trigger Type
Example	:SOUR:LIST:TRIG:TYP DAT
Notes	SCPI is supported after A.14.00
Initial S/W Revision	A.14.00

Marker 1

Sets the output trigger maker routing to Marker 1 for DataMarker in the whole source sequence.

Key Path	Source, List Sequencer, Trigger Type, DataMarker
Example	:SOUR:LIST:TRIG:TYPE:MARK M1
Notes	SCPI is supported after A.14.00
Initial S/W Revision	A.14.00

Marker 2

Sets the output trigger maker routing to Marker 2 for DataMarker in the whole source sequence.

Key Path	Source, List Sequencer, Trigger Type, DataMarker
Example	:SOUR:LIST:TRIG:TYPE:MARK M2
Notes	SCPI is supported after A.14.00
Initial S/W Revision	A.14.00

Marker 3

Sets the output trigger maker routing to Marker 3 for DataMarker in the whole source sequence.

Key Path	Source, List Sequencer, Trigger Type, DataMarker
Example	:SOUR:LIST:TRIG:TYPE:MARK M3
Notes	SCPI is supported after A.14.00
Initial S/W Revision	A.14.00

Marker 4

Sets the output trigger maker routing to Marker 4 for DataMarker in the whole source sequence.

Key Path	Source, List Sequencer, Trigger Type, DataMarker
Example	:SOUR:LIST:TRIG:TYPE:MARK M4
Notes	SCPI is supported after A.14.00
Initial S/W Revision	A.14.00

Manual Trigger Now

Pressing this key provides a software trigger event to the list sequencer. During execution of sequence, if the sequencer is halted on any step that has been configured with a “Manual” step trigger, then this key press will cause the sequencer to continue and execute the step.

Key Path	Source, List Sequencer
Remote Command	No remote command, front panel only.
Initial S/W Revision	A.05.00

Remote Software Trigger (Remote command Only)

During execution of a list sequence, the sequence will halt and wait at any step that has Step Trigger set to "Bus". Sending this command will trigger the step and continue the sequence.

Remote Command	`:SOURce:LIST:TRIGger:INITiate[:IMMediate]`
Example	:SOUR:LIST:TRIG:INIT
Initial S/W Revision	A.05.00

Query List Sequence Initiation Armed Status (Remote Command Only)

This is a blocking SCPI query to determine if source list sequence being initiated successfully or not.

Remote Command	`:SOURce:LIST:INITiation:ARMed?`
Example	:SOUR:LIST:INIT:ARMed?
Notes	The return data is in the following format: Integer
Notes	Query only SCPI. Returning "1" if list sequence has been initiated successfully, returning "0" if not. Once get "0", you can use :SYST:ERR? to query what error happened. Just like "*OPC?", this command can be blocked until event/status "IsSourceSweeping" happens, and then returns. Doing so can help user's script query armed status only once during the time interval of the initiation. As an ancillary SCPI of existing SCPI ":SOUR:LIST:TRIGger[:IMMediate]" (see "Initiate Sequence" on page 851 Initiate Sequence), the right usage of this command is to use it after ":SOUR:LIST:TRIG". If not, this command will return "1" immediately.
Notes	There is an alias SCPI ":SOURce:LIST:TRIGger:INITiation:ARMed?".
Initial S/W Revision	A.09.40

Source Preset

Allows you to preset the source settings to their default values.

Key Path	Source
Remote Command	`:SOURce:PRESet`
Example	:SOUR:PRES

Signal Track

Attempts to keep the largest magnitude signal in the center of the screen for a spectrum display. It is the equivalent of manually doing a single acquisition, doing a marker to peak search on a spectrum trace, then copying the marker position to the center frequency and repeating. (It is not necessary to be viewing a spectrum display for this function to work.)

Key Path	SPAN X Scale
Mode	VSA
Remote Command	`[:SENSe]:VECTor|ADEMod:FREQuency:CENTer:TRACk OFF|ON|0|1` `[:SENSe]:VECTor|ADEMod:FREQuency:CENTer:TRACk?`
Example	VECT:FREQ:CENT:TRAC ON VECT:FREQ:CENT:TRAC?
Couplings	Unavailable if averaging is turned on.
Preset	0
State Saved	Saved in instrument state.
Range	On | Off
Initial S/W Revision	Prior to A.02.00

Sweep/Control

Displays a menu that enables you to control time-related measurement parameters and to pause or resume the measurement.

Key Path	Front Panel
Mode	VSA
Initial S/W Revision	A.01.60 or later

Main Time

Enables you to control the length of the overall time record used in the measurement. Note that the Gate function (see "Gate" on page 656) enables you to analyze only a portion of the displayed Main Time. Time length and Res BW are related by the following equation:

Res BW = ENBW / T

where ENBW is the normalized effective noise bandwidth of the Window (see the FFT Window topic under BW for more details) and T is the time record length (in seconds).

Therefore, if you change Main Time, the Resolution bandwidth must also change, and vice versa.

Time record size (in sample points) can vary between 16 points and the full FFT size used for spectrum calculations. The FFT size is indirectly chosen by setting Freq Points (see "Freq Points" on page 658) and is equal to (Freq Points – 1)* 1.28.

Main Time length (in seconds) is the time record size times the sample period. The sample period for the Main Time result is 1/(1.28*Span).

Limits:

The maximum Main Time length is:

Max FFT size / (1.28 * Span) = (409600)/Span if Freq points state parameter is set to Auto

FFT size / (1.28 * Span) = (Freq Points – 1)/Span if Freq points parameter is manually set

Note that the minimum Res BW is related to maximum Main Time length.

The minimum Main Time length is

16 points / (1.28 * Span) = 12.5/Span

See "Res BW" on page 459 and "Res BW Coupling" on page 460 for details on couplings that can change Main Time length due to Res BW changes.

Key Path	Sweep Control
Mode	VSA
Measurement	<meas>:=VECTor|ADEMod
Remote Command	`[:SENSe]:<meas>:SWEep:TIME <time>`
	`[:SENSe]:<meas>:SWEep:TIME?`

Example	VECT:SWE:TIME 3 MS VECT:SWE:TIME?
Notes	This key is not available in measurements other than Vector or Analog Demod. The annotation is shown, however. In other measurements the time length is determined by number of symbols.
Couplings	Affected by Res BW, Span, Freq Points, and Window. See "Res BW" on page 459 and "Res BW Coupling" on page 460 for details.
Preset	12.75e-6
State Saved	Saved in instrument state.
Min	-9.9e37
Max	9.9e37
Initial S/W Revision	A.01060 or later

Pause / Resume

Pauses or resumes acquisition at the end of the current time record acquisition.

Key Path	Sweep Control
Mode	VSA
Initial S/W Revision	A.01060 or later

Gate

Accesses a menu of time gating control functions. Time gating lets you isolate a portion of a Main Time record to be used for downstream spectrum and statistical analysis (instead of the whole time record). The gate position can be changed during a stopped measurement and the instantaneous gate time and spectrum traces update immediately. Averages are restarted when gate properties change. The windowing function used in gated measurements is the same as non-gated measurements.

Key Path	Sweep Control
Mode	VSA
Initial S/W Revision	A.01060 or later

Gate

Turns time gating on or off.

Key Path	Sweep/Control
Mode	VSA
Measurement	<meas>:=VECTor|ADEMod
Remote Command	`[:SENSe]:<meas>:SWEep:EGATe:STATe OFF|ON|0|1`

	[:SENSe]:<meas>:SWEep:EGATe:STATe?
Example	VECT:SWE:EGAT:STAT ON VECT:SWE:EGAT:STAT?
Preset	0
State Saved	Saved in instrument state.
Initial S/W Revision	A.01060 or later

Gate Length

Adjusts the time between the beginning and the end of the gate.

Key Path	Sweep/Control
Mode	VSA
Measurement	<meas>:=VECTor|ADEMod
Remote Command	[:SENSe]:<meas>:SWEep:EGATe[:SPAN] <time> [:SENSe]:<meas>:SWEep:EGATe[:SPAN]?
Example	VECT:SWE:EGAT 2 MS VECT:SWE:EGAT?
Couplings	Gate length and delay are limited so that the gate always falls within the current time record. If the time record length decreases, the gate delay is limited first, then the gate length.
Preset	1.28125e-6
State Saved	Saved in instrument state.
Min	16 time samples
Max	Time record length
Initial S/W Revision	A.01060 or later

Gate Delay

Adjusts the time between the start of the time record and the beginning of the gate.

Key Path	Sweep/Control
Mode	VSA
Measurement	<meas>:=VECTor|ADEMod
Remote Command	[:SENSe]:<meas>:SWEep:EGATe:DELay <time> [:SENSe]:<meas>:SWEep:EGATe:DELay?
Example	VECT:SWE:EGAT:DEL 500 US VECT:SWE:EGAT:DEL?
Couplings	Gate length and delay are limited so that the gate always falls within the current time record. If the time record length decreases, the gate delay is limited first, then the gate length.

Preset	0
State Saved	Saved in instrument state.
Min	0
Max	Time record length – gate length
Initial S/W Revision	A.01060 or later

Freq Points

Enables you to manually enter the number of displayed frequency points. By default, the analyzer chooses the number of Freq Points displayed in Spectrum or PSD displays, depending on the Res BW or Main Time length chosen. Auto mode is recommended. The number of Freq Points is related to the number of FFT points used in spectrum calculations (which is always a power of 2).

Freq Points = (FFT points)/1.28 + 1

Note that if All Frequency Points is turned on for a selected trace, then all computed FFT points are shown. (See All Frequency Points.)

Key Path	Sweep Control
Mode	VSA
Measurement	<meas>:=VECTor|ADEMod
Remote Command	`[:SENSe]:<meas>:SWEep:POINts <integer>`
	`[:SENSe]:<meas>:SWEep:POINts?`
	`[:SENSe]:<meas>:SWEep:POINts:AUTO OFF|ON|0|1`
	`[:SENSe]:<meas>:SWEep:POINts:AUTO?`
Example	VECT:SWE:POIN 801
	VECT:SWE:POIN?
	VECT:SWE:POIN:AUTO ON
	VECT:SWE:POIN:AUTO?
Notes	Keyboard entry or setting this by SCPI forces state to manual. Any entry other than a valid value is rounded up to the next available value (or limited to the maximum).
	This key is not shown in measurements other than Vector or Analog Demod.
Couplings	See Res BW Coupling section
Preset	801
	1
State Saved	Saved in instrument state.
Range	51|101|201|401|801|1601|3201|6401|12801|25601|51201|102401|204801|409601
Initial S/W Revision	A.01060 or later

System

See "System" on page 182

Pre-demod

Accesses pre-demod time domain and frequency domain measurement results and enables you to assign them to traces.

Key Path	Trace/Detector, Data,
Mode	VSA

Main Time

Displays the Main Time data result in the selected trace.

Main Time versus Gate Time

The term is used to differentiate between the "main" time record and the "gate" time record when time gating is on.

A time record is the basic building block of the Fast Fourier Transform (FFT). The FFT takes the time-domain information in the time record and transforms it into the frequency domain.

When time gating is on, you can identify a portion of the main time-record to be used by the FFT. The term "main time-record" identifies the entire time record; the term "gate time-record" identifies the portion selected by the gate.

The following block diagram shows the blocks that create main time and gate time.

Note that the Analog Demodulation block is available only when analog demodulation is enabled.

There are many reasons why you may want to view the main time record. Here are just a few:

- To verify that there is an input signal.
- To see the characteristics of the input signal.
- To help in manually setting the input range.

Time Records and Span

If you set the analyzer to full span, the time data you see is the actual input time-record. This is raw input data – the signal from which all subsequent measurements are based.

If you set the instrument to measure a specific bandwidth (something less than full span), the time data you see is the raw input data after it has been filtered (to provide alias protection) and decimated (to obtain the desired span).

Time Records and Averaging

If rms or continuous peak-hold averaging is on, the analyzer displays the most recent time record. The analyzer does not show an averaged time waveform, because all averaging is done after the time data has

been transformed to the frequency domain.

If time averaging is on, the analyzer displays the averaged time-record. In other words, the time record has been averaged with previous time records.

How the Analyzer Displays the Time Record

It is important to remember that although the time record looks like an oscilloscope display, the analyzer is not a digital oscilloscope.

The time record represents samples of a waveform. The samples have enough information to accurately reconstruct the input signal – but the human eye may not properly perform the reconstruction. In fact, for frequencies that are higher than about ten percent of the frequency span, there is noticeable visible distortion.

The analyzer's anti-alias filters cause some ringing or distortion of square waves or transients when viewed in the time domain.

See also: Data

Key Path	Trace/Detector, Data
Mode	VSA
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Auto Correlation

Displays the autocorrelation data result in the selected trace. Auto Correlation trace data displays the autocorrelation for the selected input channel. Autocorrelation is a form of correlation, a measure of the similarity between two signals.

Note that Auto Correlation is not available when digital demodulation is selected.

Tips

- Use ac coupling only. Correlation measurements are disturbed by dc offsets in the signal.
- Some types of averaging can be useful – rms averaging does not affect correlation measurements, but you can use time averaging to reduce noise, if you can provide a consistent trigger. However, averaging is usually unnecessary to make good correlation measurements.
- Use appropriate triggering and trigger delays. This is especially true for time averaging.
- Use a random noise source for delay measurements. Correlation measurements provide the ability to resolve time differences between waveforms that appear to be random.
- Waveforms on the correlation trace may not appear as they do in the time trace. This is particularly noticeable when you are using correlation to extract synchronous signals from noise. The different shape of some waveforms is a direct result of the mathematical definition of correlation. For example, a correlated square wave appears as a triangle wave. It's important to remember that the period of the waveform is preserved even if the correlation waveform looks different.

- To avoid wrap-around effects, correlation produces a time record one-half the length of the measurement time-record.

Theory of Operation

Autocorrelation is a form of correlation, a measure of the similarity between two signals. Correlation is performed by multiplying two signals together at each instant in time and summing all the products. If the signals are identical, every product is positive and the resulting sum is large.

If, however, the two signals are dissimilar, then some of the products are positive and some are negative. In this case, the final sum is smaller because the products tend to cancel.

Autocorrelation performs a time-shifted, "averaged" correlation on a single signal. The signal is correlated with time-shifted versions of itself. Furthermore, the products from each time-shift are averaged by dividing each final sum by the number of products contributing to it.

where: Rxx = autocorrelation function

τ = amount of time shift

∞ = infinity

$x(\tau)$ = signal to be correlated

intgrl = integration

conj = conjugation

T = time

$\times$ = multiplication

That is, the autocorrelation function is found by taking a signal, multiplying it by the same signal displaced (tau) units in time, and averaging the product over all time.

Duality With the Power Spectrum

For simplicity and speed, this analyzer performs the autocorrelation operation by taking advantage of its duality with the power spectrum:

Thus,

When to use Auto Correlation

Auto correlation is useful for detecting echoes in a signal. For random noise, an echo appears as an impulse – if there is more than one echo, you can see multiple peaks on the auto correlation trace. Keep in mind that an echo appears as an impulse only if the delayed signal has not been filtered. The impulse broadens as the original random noise signal is filtered – in fact, the width of each peak is inversely proportional to the bandwidth of the signal.

To determine the time delay (in seconds) of an echo, you can move the marker to the peak of the echo. Note that there is always a correlated peak at zero lag – this peak marks the original excitation signal. Any other peaks let you know that the excitation signal also appeared at another time relative to the original signal. The amplitude value at the zero lag point is the total power in the time record.

This function is also useful for isolating low-level periodic signals from noise. A sine wave signal shows up as a sine wave in auto correlation. A square wave signal shows up as a triangular wave of the same frequency.

Auto correlation is a single-channel measurement. If you have the original signal on one channel and the delayed version on another, use cross correlation.

Auto Correlation and Averaging

The following formulas show how the analyzer calculates auto correlation for different averaging functions:

Key: F = Fast Fourier Transform (FFT)

AC = Averaged correlation

AT = Averaged time

t = Instantaneous time

c = Instantaneous correlation

r = 1/2 width rectangular window

× = multiplication

n = Average number

No Average $c = I (conj (F(r \times t)) \times F [t])$

rms Average $c = I (conj (F(r \times t)) \times F [t])$

rms Expon. $c = I (conj (F(r \times t)) \times F [t])$

Average

Continuous

Peak Hold $c = I (conj (F(r \times t)) \times F [t])$

Average

Time $AC [n] = I (conj (F(r \times AT [n])) \times F (AT [n]))$

Average

Time

Expon. $AC[n] = I (conj (F(r \times AT [n])) \times F (AT [n]))$

Average

and: $1 < n <$ number of averages

See also: Data

Key Path	Trace/Detector, Data

Mode	VSA
Initial S/W Revision	Prior to A.02.00

Statistical

Accesses the Trace Data choices that show the statistical results: CCDF, CDF and PDF.

Key Path	Trace/Detector, Data
Mode	VSA

Demod

Accesses demodulated time domain, frequency domain and statistical measurement results and enables you to assign them to traces. The keys are labeled AM, FM or PM according to the current demodulation choice.

Key Path	Trace/Detector, Data,
Mode	VSA

AM|FM|PM Spectrum

Assigns the selected trace to display the demodulated Spectrum data result, that is, the spectrum of the demodulated data. Note that this is a baseband spectrum because the demodulated data is purely real. Because a baseband spectrum is conjugate-symmetric around 0 freq, only half of the spectrum is shown. Therefore, its displayed span is only half the measured span. This measurement result is affected by the averaging setting in the same manner as the Pre-demod Spectrum.

Key Path	Trace/Detector, Data,
Mode	VSA

Inst AM|FM|PM Spectrum

Assigns the selected trace to display the instantaneous (i.e., non-averaged) demodulated Spectrum data result, that is, the spectrum of the demodulated data. Note that this is a baseband spectrum because the demodulated data is purely real. Because a baseband spectrum is conjugate-symmetric around 0 freq, only half of the spectrum is shown. Therefore, its displayed span is only half the measured span.

Key Path	Trace/Detector, Data,
Mode	VSA

AM|FM|PM Main Time

Assigns the selected trace to display the demodulated Main Time data result. Note that demodulated Main Time data is purely real. Demodulated Main Time responds to averaging settings in the same manner that Pre-demod Main Time does.

Key Path	Trace/Detector, Data,
Mode	VSA

AM|FM|PM Gate Time

Assigns the selected trace to display the demodulated Gate Time data result. Note that demodulated Gate Time data is purely real. Demodulated Gate Time responds to averaging settings in the same manner that Pre-demod Main Time does.

Key Path	Trace/Detector, Data,
Mode	VSA

Inst AM|FM|PM Main Time

Assigns the selected trace to display the demodulated instantaneous (i.e., non-averaged) Main Time data result. Note that demodulated Main Time data is purely real.

Key Path	Trace/Detector, Data,
Mode	VSA

AM|FM|PM PSD

Assigns the selected trace to display the Power Spectral Density of the demodulated time data. This is similar to the demodulated Spectrum result but has been scaled to reflect power per Hertz.

Key Path	Trace/Detector, Data,
Mode	VSA

AM|FM|PM CCDF

Assigns the selected trace to display the complementary, cumulative density function (CCDF) of the demodulated time data. See CCDF (Complementary, Cumulative Density Function) for a description of this function.

Key Path	Trace/Detector, Data,
Mode	VSA

AM|FM|PM CDF

Assigns the selected trace to display the , cumulative density function (CDF) of the demodulated time data. See CDF (Cumulative Density Function) for a description of this function.

Key Path	Trace/Detector, Data,
Mode	VSA

AM|FM|PM PDF

Assigns the selected trace to display the probability density function (PDF) of the demodulated time data. See PDF (Probability Density Function) for a description of this function.

Key Path	Trace/Detector, Data,
Mode	VSA

AM|FM|PM Auto Correlation

Assigns the selected trace to display the autocorrelation of the demodulated time data. See "Auto Correlation" on page 660 for a description of this function.

Key Path	Trace/Detector, Data,
Mode	VSA

Data 5

Selects register 5 for assignment of trace data.

Key Path	Trace/Detector, Data, Register
Mode	VSA
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Data 6

Selects register 6 for assignment of trace data.

Key Path	Trace/Detector, Data, Register
Mode	VSA
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Limit Test (SCPI Only)

Enables you to enable or disable the Limit Test function for each Trace when the Trace supports the Limit Test function.

When enabled, if the limit test fails on the trace, “FAIL” is shown on the Meas Bar. Otherwise, “PASS” is shown.

Available only for the EVM measurement.

Mode	VSA, LTE, LTETDD
Measurement	<meas>:=EVM
Remote Command	`:CALCulate:<meas>:TRACe[1]|2|...|4:LIMit:VISible OFF|ON|0|1` `:CALCulate:<meas>:TRACe[1]|2|...|4:LIMit:VISible?`
Example	CALC:EVM:TRAC1:LIM:VIS ON CALC:EVM:TRAC1:LIM:VIS?
Notes	On the LTE/LTETDD EVM measurement, the following trace data is supported: In-band Emissions Eq Ch Freq Resp Per Slot Limit data can be queried by :CALC:EVM:DATA[1]|2|3|4? LL|UL command.
Preset	0
State Saved	Saved in instrument state.
Initial S/W Revision	A.08.00

Trigger

See ___ on page X

Free Run

See ___ on page X

Video

See ___ on page X

Trigger Level

See ___ on page X

Trig Slope

See ___ on page X

Trig Delay

See ___ on page X

Trig Holdoff

See ___ on page X

Holdoff Type

See ___ on page X

External 1

See ___ on page X

Trigger Level

See ___ on page X

Trig Slope

See ___ on page X

Trig Delay

See ___ on page X

Trig Holdoff

See ___ on page X

Holdoff Type

See ___ on page X

Trig Reference Line

See ___ on page X

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

NOTE In products that run multiple instances of the X-Series Application, all instances use the same location to save User Preset state. So Save User Preset of one instance will overwrite the Save User Preset of another instance.

Key Path	Front-panel key
Backwards Compatibility Notes	User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data. In the X-Series, "state" always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users. On ESA and PSA, User Preset affected the entire instrument's state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode. User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.
Initial S/W Revision	Prior to A.02.00

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.

- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	`:SYSTem:PRESet:USER`
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER
Notes	:SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed
Couplings	A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	`:SYSTem:PRESet:USER:ALL`
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL
Notes	Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state.
Couplings	A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode.

	Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

Key Path	User Preset
Remote Command	`:SYSTem:PRESet:USER:SAVE`
Example	:SYST:PRES:USER:SAVE
Notes	:SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM: STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file.
Initial S/W Revision	Prior to A.02.00

View/Display (View Presets)

Displays a menu that enables you to select display parameters for the current measurement.

View Presets affect the trace layout, trace data assignment, scaling and formatting but do not affect hardware measurement setup.

Key Path	Front Panel
Mode	VSA
Remote Command	`:DISPlay:ADEMod:VIEW:PRESet DSPectrum|STATistics`
Example	DISP:ADEM:VIEW:PRES DSP

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

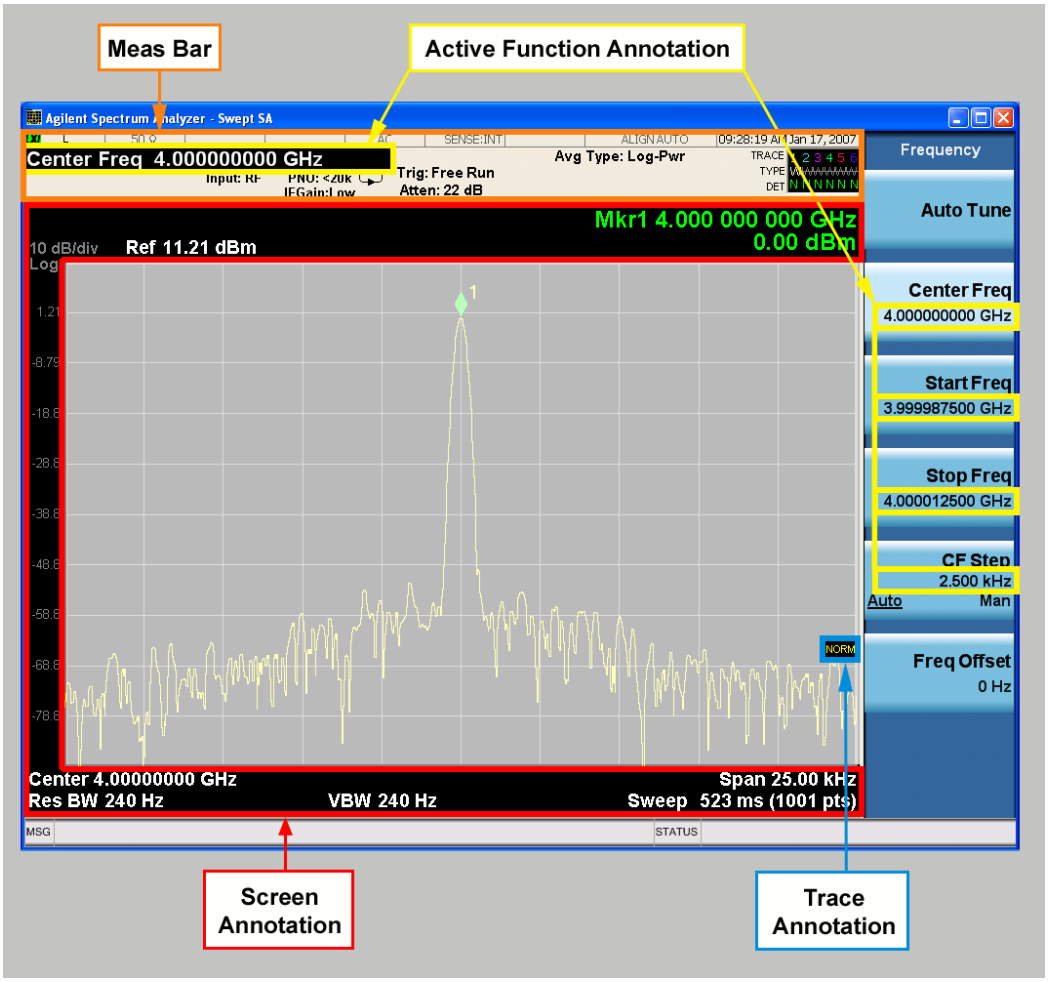
Key Path	Display
Key Path	View/Display
Initial S/W Revision	Prior to A.02.00

Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.



Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

Key Path	View/Display, Display, Annotation
Remote Command	`:DISPlay:ANNotation:MBAR[:STATe] OFF|ON|0|1` `:DISPlay:ANNotation:MBAR[:STATe]?`
Example	DISP:ANN:MBAR OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off.
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Screen

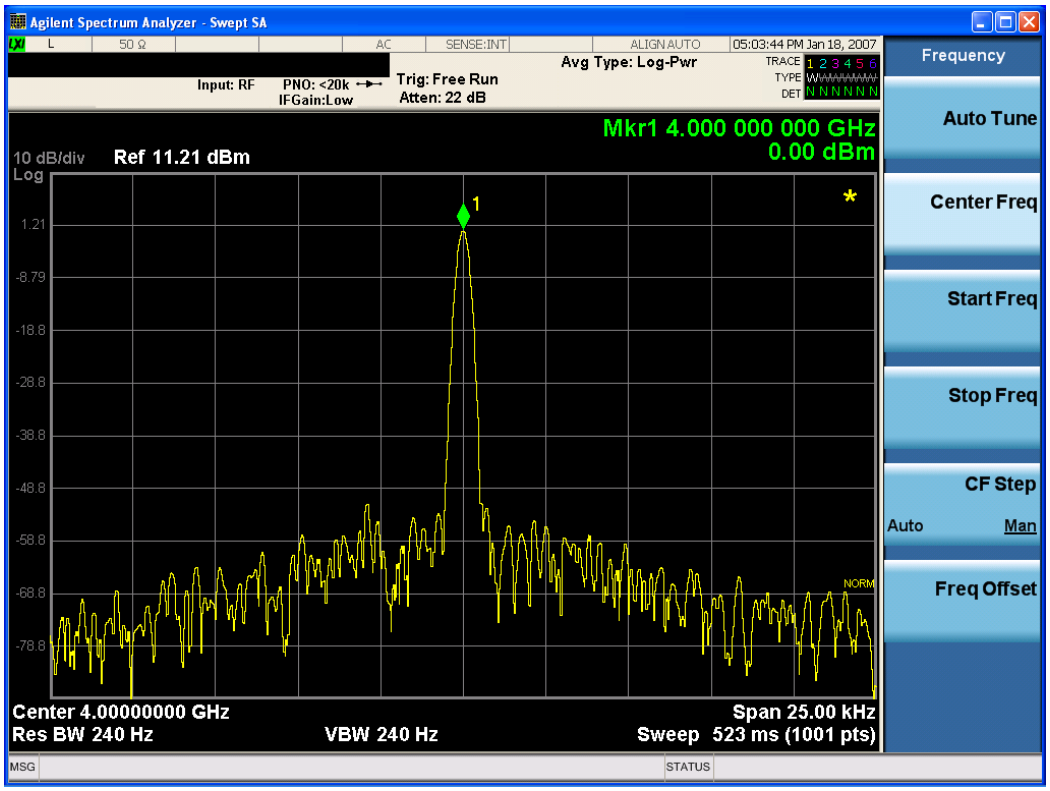
This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

Key Path	View/Display, Display, Annotation
Remote Command	`:DISPlay:ANNotation:SCReen[:STATe] OFF|ON|0|1` `:DISPlay:ANNotation:SCReen[:STATe]?`
Example	DISP:ANN:SCR OFF
Dependencies	Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..



Key Path	View/Display, Display, Annotation
Remote Command	`:DISPlay:ACTivefunc[:STATe] ON|OFF|1|0` `:DISPlay:ACTivefunc[:STATe]?`
Example	DISP:ACT OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Title

Displays menu keys that enable you to change or clear a title on your display.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

Key Path	View/Display, Display, Title
Mode	All
Remote Command	`:DISPlay:<measurement>:ANNotation:TITLe:DATA <string>` `:DISPlay:<measurement>:ANNotation:TITLe:DATA?`
Example	DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title
Notes	Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters.
Preset	No title (measurement name instead)
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

Key Path	View/Display, Display, Title
Example	The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required.
Notes	Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted).
Preset	Performed on Preset.
Initial S/W Revision	Prior to A.02.00

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

Key Path	View/Display, Display
Remote Command	`:DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF|ON|0|1` `:DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]?`
Example	DISP:WIND:TRAC:GRAT:GRID OFF
Notes	The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis.
Preset	On
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

Key Path	View/Display, Display, System Display Settings
Remote Command	`:DISPlay:WINDow[1]:ANNotation[:ALL] OFF|ON|0|1` `:DISPlay:WINDow[1]:ANNotation[:ALL]?`
Example	:DISP:WIND:ANN OFF
Preset	On (Set by Restore Misc Defaults)
State Saved	Not saved in instrument state.
Backwards Compatibility Notes	The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The Themes option is the same as the Themes option under the Display and Page Setup dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	`:MMEMory:STORe:SCReen:THEMe TDColor | TDMonochrome | FCOLor | FMONochrome` `:MMEMory:STORe:SCReen:THEMe?`
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color | 3D Mono | Flat Color | Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

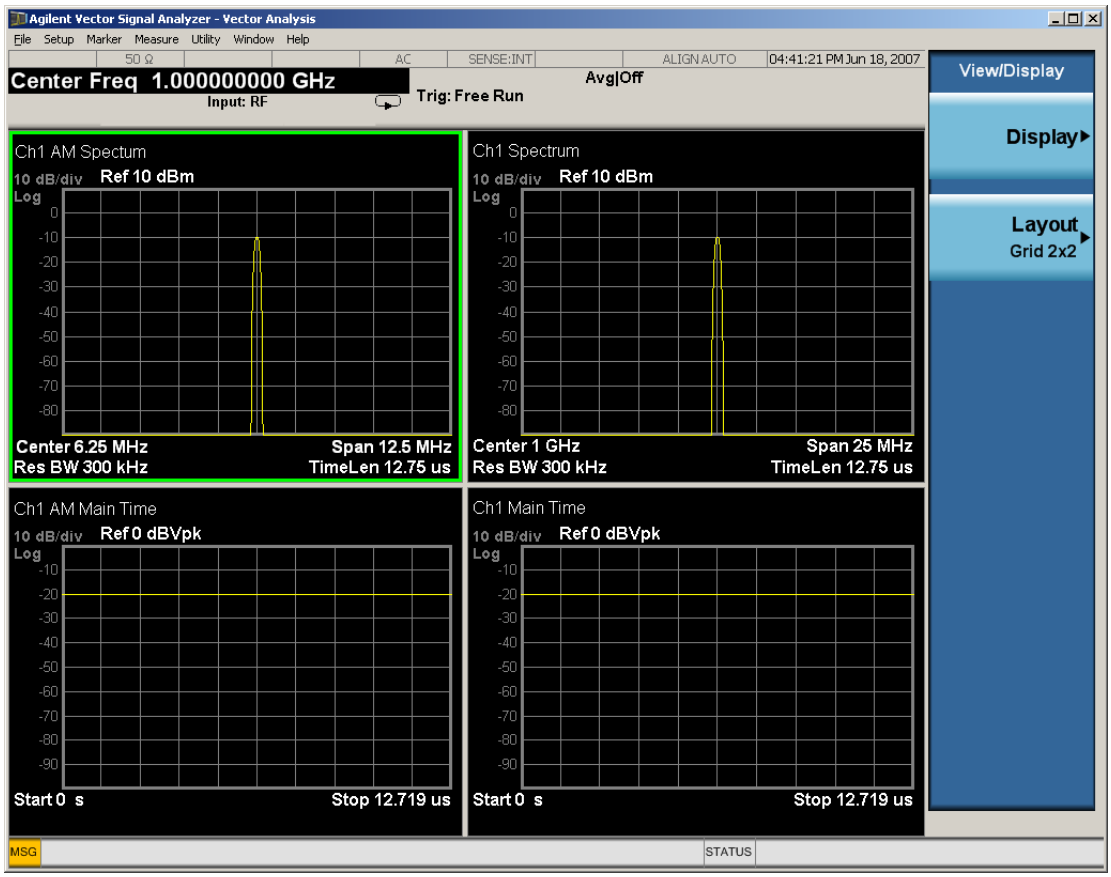
Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Preset View: Demod Spectrum/Time

Shows a quad layout with the Demod Spectrum in trace 1, Demod Main Time in trace 2, input Spectrum in trace 3, and input Main Time in trace 4.

Key Path	View/Trace
Mode	VSA



Preset View: Statistics

Shows a stacked 2 layout with the CCDF of the input in trace 1 and input Main Time in trace 2.

Key Path	View/Trace
Mode	VSA

Agilent Vector Signal Analyzer - Vector Analysis
50 Ω
AC
SENSE:EXT
ALIGN AUTO
05:34:11 PM Jun 15, 2007
Center Freq 1.000000000 GHz
Input: RF
Trig: Free Run
Avg|Off
Trace/Detector
Select Trace
Trace 1
Data
CCDF
Format
Log Mag
More
1 of 2
Ch1 CCDF
10 %/div
Log
Ref 100 %
90
80
70
60
50
40
30
20
10
Start 0 dB
Stop 20 dB
Ch1 Main Time
10 dB/div
Log
Ref 0 dBVpk
-10
-20
-30
-40
-50
-60
-70
-80
-90
Start 0 s
Stop 7.9922 ms
MSG
STATUS

9 Digital Demod Measurement

The Digital Demod measurement is accessed from the Meas hardkey. The Digital Demod measurement builds upon basic Vector analysis by including flexible demodulation of a wide variety of standard and custom single-carrier modulation formats. You can simultaneously view pre-demod time and spectrum displays, demodulated signal, reconstructed reference signal, recovered symbols and various error traces and summaries.

Measurements are possible on continuous or pulsed (burst) carriers (such as TDMA). In addition, you can specify a sync pattern and an offset to look at selected segments of demodulated data.

The digital demodulator uses your signal to generate an ideal signal (called I/Q reference or FSK reference). You can compare the measured signal to the reference signal to quantify and locate errors in your signal.

Digital demodulation has built-in filters that can be applied to the measured signal as well as to the reference signal. This provides maximum flexibility in comparing your signal to an ideal signal. Additionally, this provides complete flexibility to probe any analog point in a communication system.

This topic contains the following sections:

"Remote Command Results for Digital Demod Measurement" on page 684

"Front Panel Results" on page 686

Remote Command Results for Digital Demod Measurement

The Digital Demod measurement is invoked remotely by the following:

```
:CONFigure:DDEMod
```

```
:CONFigure:DDEMod:NDEFault
```

```
:INITiate:DDEMod
```

All trace and tabular data results are available using CALCulate:DDEMod:DATA commands. These commands also enable you to get names and units of results.

Symbol/Error Table results can also be obtained using the FETCh or READ commands. The Sym/Err table must be assigned to a trace in order to obtain valid results.

```
:FETCh:DDEMod[n]?
```

```
:READ:DDEMod[n]?
```

```
:MEASure:DDEMod[n]?
```

For more information and remote commands, see Remote SCPI Commands and Data Queries.

Also see Trace/Detector, Data for more measurement SCPI commands.

Condition	N	Results Returned
All Mod Formats	Not specified, or n=1	Error Summary Table Returns 61 comma-separated scalar results, corresponding to the items in the table portion of the Syms/Err trace. Note some values are not available (n/a) for some formats. NaN (9.91 E 37) is returned for results that are not available. 1. EVM rms (% rms) (n/a for FSK) 2. EVM peak (% pk) (n/a for FSK) 3. symbol position of EVM peak (n/a for FSK) 4. offset EVM rms (% rms) (OQPSK only, n/a otherwise) 5. offset EVM peak (% pk) (OQPSK only, n/a otherwise) 6. symbol position of Offset EVM peak (OQPSK only, n/a otherwise) 7. FSK err rms (% rms) (FSK only, n/a otherwise) 8. FSK err peak (% pk) (FSK only, n/a otherwise) 9. symbol position of FSK err peak (FSK only, n/a otherwise) 10. magnitude error rms (% rms). 11. magnitude error peak (% pk) 12. symbol position of magnitude error peak 13. phase error rms (deg) (n/a for FSK) 14. phase error peak (deg pk) (n/a for FSK) 15. symbol position of phase error peak (n/a for FSK) 16. frequency error (Hz) (n/a for FSK) 17. carrier offset (Hz) (FSK only, n/a otherwise) 18. SNR(MER) (dB) (QPSK, QAM, APSK and VSB only, n/a otherwise) 19. FSK deviation (Hz) (FSK only, n/a otherwise)

	20. Pilot Level (dB) (8 VSB only, n/a otherwise) 21. time offset (s) (triggered APSK only, n/a otherwise) 22. IQ offset (dB) (n/a for FSK, VSB) 23. amplitude droop (dB/sym) (n/a for QPSK, OQPSK, MSK Type 1, QAM, APSK, VSB and FSK) 24. rho (QPSK and OQPSK only, n/a otherwise) 25. quadrature error (deg) (n/a for BPSK, VSB and FSK) 26. gain imbalance (dB) (n/a for BPSK, VSB and FSK) 27. R2/R1 ratio (dimensionless) (APSK only, n/a otherwise) 28. R3/R1 ratio (dimensionless) (APSK 32 only, n/a otherwise) 29. peak EVM mean (%) (EDGE only, n/a otherwise) 30. 95% EVM (%) (EDGE only, n/a otherwise) 57. 2FSK symbol clock error(ppm) (2FSK only, n/a otherwise) 58. 2FSK zero cross error rms(%rms) (2FSK only, n/a otherwise) 59. 2FSK zero cross error peak(%pk) (2FSK only, n/a otherwise)

Also available are the standard ACP and OBW tables.

See Trace/Detector.

Front Panel Results

Digital Demod results can be displayed in any trace, and the traces viewed in a variety of layouts that show 1, 2, 3, or 4 traces at a time. Each trace can be scaled as desired regardless of measurement settings, or auto-scaled to reflect measurement settings. Data can be formatted in a variety of ways. (For example, you can view the log magnitude of complex data, the real or imaginary part, etc.) You can use View Presets to view frequently used results, or to provide a familiar starting point from which you can customize your own view.

Key Path	Front Panel
Mode	VSA

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

Key Path	Front-panel key
Remote Command	`:INITiate:CONTinuous OFF|ON|0|1` `:INITiate:CONTinuous?`
Example	:INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation
Preset	ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF)
State Saved	Saved in instrument state
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep.
Initial S/W Revision	Prior to A.02.00

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until k = N, at which point the current sequence will stop and the instrument will go to the idle state.

File

See "File" on page 176

Input/Output

See "Input/Output" on page 118

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE **Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.**

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Remote Measurement Functions

This section contains the following topics:

"Measurement Group of Commands" on page 692

"Current Measurement Query (Remote Command Only) " on page 694

"Limit Test Current Results (Remote Command Only)" on page 694

"Data Query (Remote Command Only)" on page 694

"Calculate/Compress Trace Data Query (Remote Command Only)" on page 695

"Calculate Peaks of Trace Data (Remote Command Only)" on page 700

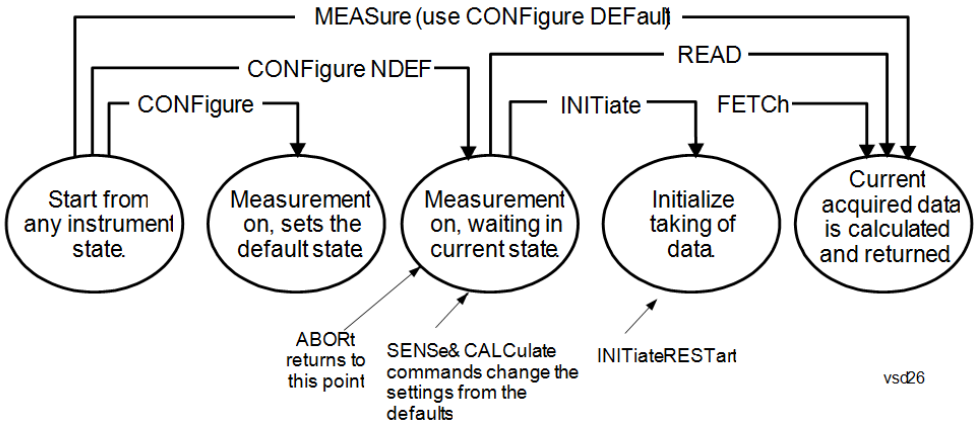
"Hardware-Accelerated Fast Power Measurement (Remote Command Only)" on page 701

"Format Data: Numeric Data (Remote Command Only)" on page 715

"Format Data: Byte Order (Remote Command Only)" on page 716

Initial S/W Revision	Prior to A.02.00

Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFigure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFigure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
- For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
- Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
- If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
- For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
- Blocks other SCPI communication, waiting until the measurement is complete before returning the results
- If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)

Initial S/W Revision	Prior to A.02.00

Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

Remote Command	`:CONFigure?`
Example	CONF?
Initial S/W Revision	Prior to A.02.00

Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

Remote Command	`:CALCulate:CLIMits:FAIL?`
Example	CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails.
Initial S/W Revision	Prior to A.02.00

Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDer and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

Remote Command	`:CALCulate:DATA[n]?`
Notes	The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCh:<measurement>? query where <measurement> is the current measurement.
Initial S/W Revision	Prior to A.02.00

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

Remote Command	`:CALCulate:DATA<n>:COMPress? BLOCk | CFIT | MAXimum | MINimum | MEAN | DMEan | RMS | RMSCubed | SAMPle | SDEViation | PPHase [,<soffset>[,<length>[,<roffset>[,<rlimit>]]]]`
Example	To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.)
Notes	The command supports 5 parameters. Note that the last 4 (<soffset>,<length>,<roffset>,<rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data.
Initial S/W Revision	Prior to A.02.00

- BLOCk or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.
-

NOTE If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$\mathrm{MEAN} = \frac{1}{n} \sum_{Xi \in \mathrm{region(s)}} Xi$$

where Xi is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$\mathrm{MEAN} = \frac{1}{n} \sum_{Xi \in \mathrm{region(s)}} |Xi|$$

where |Xi| is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$DME = 10 \times \log_{10}\left(\frac{1}{n}\sum_{Xi \in region(s)} 10^{\frac{Xi}{10}}\right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$RMS = \sqrt{\frac{1}{n}\sum_{Xi \in region(s)} Xi^2}$$

where Xi is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$RMS = \sqrt{\frac{1}{n}\sum_{Xi \in region(s)} Xi\ Xi^*}$$

where Xi is the complex value representation of an I/Q pair, Xi* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPle - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEViation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$SDEV = \sqrt{\frac{1}{n} \sum_{Xi \in region(s)} (Xi - \overline{X})^2}$$

where Xi is a data point value, X is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$SDEV = \sqrt{\frac{1}{n} \sum_{Xi \in region(s)} (|Xi| - \overline{X})^2}$$

where |Xi| is the magnitude of an I/Q pair, X is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector (n=0) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

  The rms power of the specified region may be expressed as:

  Power = 10 x log [10 x (RMS I/Q value)] + 10.

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{Xi \in region} Xi \, Xi^*}$$

where Xi is the complex value representation of an I/Q pair, Xi* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

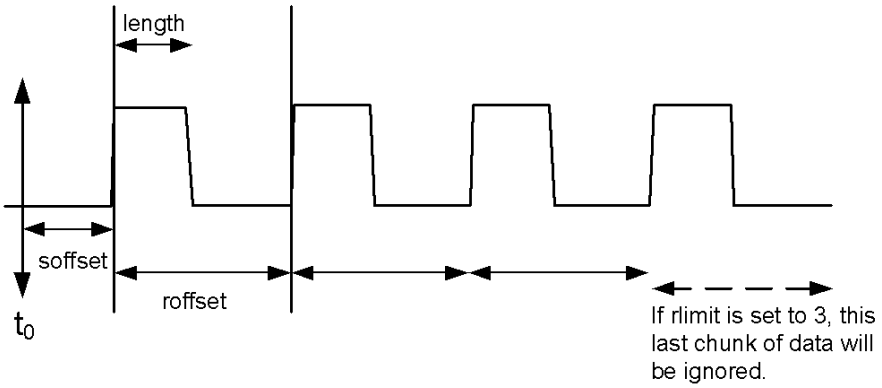
$$\frac{1}{n} \sum_{Yi \in region} Yi$$

where Yi is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

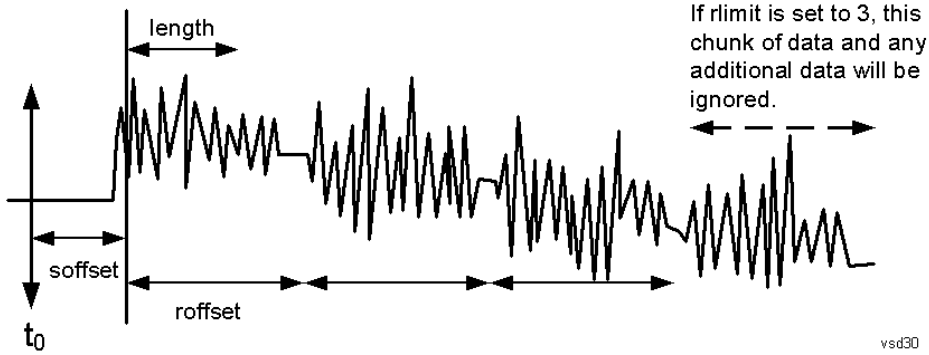
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints – 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints – 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints – 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDer and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

Remote Command	For Swept SA measurement:
	`:CALCulate:DATA[1]|2|...|6:PEAKs? <threshold>,<excursion>[,AMPLitude | FREQuency | TIME[,ALL | GTDLine | LTDLine]]`
	For most other measurements:
	`:CALCulate:DATA[1]|2|...|6:PEAKs? <threshold>,<excursion>[,AMPLitude | FREQuency | TIME]`

Example	Example for Swept SA measurement in Spectrum Analyzer Mode: CALC:DATA4:PEAK? –40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above –40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned. Query Results 1: With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time). If no peaks are found the peak list will consist of only the number of peaks, (0).
Notes	<n> - is the trace that will be used <threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as –200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu. <excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the

	excursion value stored under the Peak Criteria menu. Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL). Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reportedSorting order: AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent) FREQuency - lists the peaks in order of occurrence, left to right across the x-axis. TIME - lists the peaks in order of occurrence, left to right across the x-axis. Peaks vs. Display Line: ALL - lists all of the peaks found (default if optional parameter not sent). GTDLine (greater than display line) - lists all of the peaks found above the display line. LTDLine (less than display line) - lists all of the peaks found below the display line.
Initial S/W Revision	Prior to A.02.00

Hardware-Accelerated Fast Power Measurement (Remote Command Only)

The Fast Power option (FP2) enables very fast channel power measurements for instruments with the prerequisite hardware (DP2 and/or B40). It accomplishes this by peforming real-time overlapped FFTs at the hardware layer, using software for basic post-processing before returning the result to the user. The upshot of this approach is improved throughput for user applications that require many sequential power measurements.

The analysis bandwidth of FP2 is limited by the licenses in the instrument, but its maximum overall analysis bandwidth per acquisition is 40 MHz.

FP2 is remote-only, which means the instrument does not switch to any particular mode or measurement. FP2 commands can be sent while another application is in use on the front panel.

Each Fast Power measurement can be predefined using an array index, and up to 1,000 measurements can be stored. In the following documentation, instances of [1,2,...,999] can be substituted with a particular measurement index, e.g. CALC:FPOW:POW1?, CALC:FPOW:POW2?, CALC:FPOW:POW134?. In this way, power measurements can be defined one time in a batch, and then executed multiple times without having to redefine them, similar to “list mode” on other measurements.

In addition to basic channel power measurements, there are a number of other measurement “functions” for each channel, including peak power, peak frequency, and power spectral density. See the Function parameter for more information.

Reset Fast Power Measurement (Remote Command Only)

Resets the measurement configuration to the defaults.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:RESet`
Example	:CALC:FPOW:POW1:RES

Notes	Option FP2 is required.
Initial S/W Revision	A.14.00

Define Fast Power Measurement (Remote Command Only)

Fast Power acquisitions are configured using the DEFine command. This command accepts a comma-delimited string of configuration parameters and their appropriate values, which are all specified in the subsection below.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:DEFine "configuration string"`
Example	:CALC:FPOW:POW1:DEF "CenterFrequency=2e9, AcquisitionTime=0.005"
Notes	See below for a list of measurement variables that can be defined in the configuration string.
Initial S/W Revision	A.14.00

Acquisition Time

Example	CALC:FPOW:POW1:DEF "AcquisitionTime=0.002"
Notes	The acquisition time parameter sets the time in which the entire spectrum is measured. An increase in the acquisition time yields an improvement in measurement repeatability.
Preset	0.001 s
Range	0 s to 1 s
Default Unit	Time (s)
Initial S/W Revision	A.14.00

Center Frequency

Example	CALC:FPOW:POW1:DEF "CenterFrequency=2e9"
Notes	The center frequency parameter sets the frequency in which the measurement is centered around. The OffsetFrequency parameter is calculated relative to the center frequency.
Preset	1 GHz
Range	0 Hz to maximum instrument frequency
Default Unit	Frequency (Hz)
Initial S/W Revision	A.14.00

DC Coupled

Example	CALC:FPOW:POW1:DEF "DCCoupled=True"
Notes	The DC coupled parameter allows the user to specify whether the DC blocking capacitor is utilized. Set parameter to true when measuring frequencies below 10 MHz.
Preset	False
Range	True (DC Coupled) or False (AC Coupled)
Default Unit	Boolean
Initial S/W Revision	A.14.00

DetectorType

Example	CALC:FPOW:POW1:DEF "DetectorType=Peak"
Notes	Option FP2 is required. The detector type parameter allows the user to choose whether a RMS average or peak value is used during the measurement.
Preset	RmsAverage
Range	RmsAverage, Peak
Initial S/W Revision	A.14.00

Do Noise Correction

Example	CALC:FPOW:POW1:DEF "DoNoiseCorrection=True"
Notes	When noise correction is enabled, the linear noise power contributed by the analyzer is subtracted from all measurements. This effectively lowers the noise floor of the analyzer. When noise correction is enabled, the first measurement for a given set of input parameters will take extra time. This is because the analyzer takes an extra acquisition with the RF input disconnected from the analyzer's front end to measure the noise of just the analyzer. The measured noise floor is stored in a cache so the noise acquisition will occur only once for the same state settings. In other words, if noise correction was turned on and the analyzer made an acquisition at frequency A, then frequency B, and back again to frequency A, the hidden initial noise floor acquisition would only occur for the first acquisition at frequency A and the cached noise floor would be used the second time frequency A was measured.
Preset	False
Range	True (enable noise correction) or False (disable noise correction)
Default Unit	Boolean
Initial S/W Revision	A.14.00

Do Spur Suppression

Example	CALC:FPOW:POW1:DEF "DoSpurSuppression=True"
Notes	When measuring very low level signals, or when large out-of-band inputs are input into the analyzer, sometimes unwanted spurs and residuals can appear in the measured spectrum. Spur suppression is a method to help minimize the levels of these internally generated spurs and residuals. When spur suppression is enabled, the analyzer will automatically take two acquisitions using two different internal analog LO frequencies. The FFT spectrums from both acquisitions are combined by taking the minimum power between both traces on a per FFT bin basis. External signals will have the same amplitude for both traces and therefore will return the expected amplitudes. However, low level spurs and residuals generated internally to the analyzer tend to move to different FFT bins depending on the internal analog LO frequency used, and therefore tend to be suppressed using this spur suppression method. Because two acquisitions, rather than a single acquisition, are made when spur suppression is enabled, the measurement time will always be slower when spur suppression is enabled.
Preset	False
Range	True (enable spur suppression) or False (disable spur suppression)
Default Unit	Boolean
Initial S/W Revision	A.14.00

Electronic Attenuator Bypass

Example	CALC:FPOW:POW1:DEF "ElecAttBypass =False"
Notes	The electronic attenuation bypass parameter allows the user to either utilize or bypass the electronic attenuator. The electronic attenuator is only available for frequencies up to 3.6 GHz. Set parameter to true when using frequencies above 3.6 GHz and set the parameter to false when using the preamp.
Preset	True
Range	True (bypass electronic attenuator) or False (use electronic attenuator)
Default Unit	Boolean
Initial S/W Revision	A.14.00

Electronic Attenuation

Example	CALC:FPOW:POW1:DEF "ElecAttenuation=10"
Notes	Option EA3 is required. The electronic attenuation value parameter sets the amount of electrical attenuation from 0 to 24 dB (1 dB steps). Set "ElecAttBypass=False" to make sure the electronic attenuator path is enabled.
Preset	0 dB
Range	0 – 24 dB (1 dB steps)

Default Unit	dB
Initial S/W Revision	A.14.00

IF Gain

Example	CALC:FPOW:POW1:DEF "IFGain=10"
Notes	The IF gain parameter allows the user to specify the gain at the IF stage anywhere from –6 to 16 dB (1 dB steps). This is an advanced feature, and for most cases this should remain at its default value of 0 dB.
Preset	0 dB
Range	–6 – 16 dB (1 dB steps)
Default Unit	dB
Initial S/W Revision	A.14.00

IF Type

Example	CALC:FPOW:POW1:DEF "IFType=B25M"
Notes	The IF type parameter allows the user to select between different IF paths. For example, if the signal is less than 25 MHz wide, then the user can select the B25M path to take advantage of additional filtering on this analog IF path.
Preset	B40M
Range	B10M, B25M, B40M
Initial S/W Revision	A.14.00

Include Power Spectrum

Example	CALC:FPOW:POW1:DEF "IncludePowerSpectrum=True"
Notes	The power spectrum parameter allows the user to read data on the entire spectrum for diagnostic purposes. It is not recommended for production use. See CALC:FPOW:POW[n]:READ2? for details on the binary format of the response.
Preset	False
Range	True (return both channel power and full power spectrum) or False (returns only channel power)
Default Unit	Boolean
Initial S/W Revision	A.14.00

Mechanical Attenuation

Example	CALC:FPOW:POW1:DEF "MechAttenuation=10"
Notes	The mechanical attenuation value parameter sets the amount of mechanical attenuation anywhere from 0 to 70 dB (2 dB steps).
Preset	0 dB
Range	0 – 70 dB (2 dB steps)
Default Unit	dB
Initial S/W Revision	A.14.00

Preamp Mode

Example	CALC:FPOW:POW1:DEF "PreAmpMode=Low"
Notes	The license for the appropriate preamp is required. The preamp mode parameter specifies whether the preamps are being utilized. Low allows any preamps up to 3.6 GHz, and Full allows all licensed preamps. Set "ElecAttBypass=True" in order to utilize any preamps.
Preset	Off
Range	Off, Low, Full
Initial S/W Revision	A.14.00

Resolution Bandwidth Mode

Example	CALC:FPOW:POW1:DEF "PreAmpMode=Low"
Notes	The resolution bandwidth mode parameter allows the user to choose whether the RBW filter is automatically or manually set. The BestSpeed value minimizes measurement time, while the Narrowest value minimizes RBW size (minimum of two FFT bins per RBW). To manually specify an RBW, set this parameter to Explicit, and set the ResolutionBW parameter to the desired value.
Preset	BestSpeed
Range	BestSpeed, Narrowest, Explicit
Initial S/W Revision	A.14.00

Resolution Bandwidth

Example	CALC:FPOW:POW1:DEF "ResolutionBW=25e3"
Notes	The resolution bandwidth parameter sets the 3-dB bandwidth of the RBW filter. The ResolutionBWMode parameter must be set to Explicit in order to manually set the RBW.

Preset	0 Hz
Default Unit	Hz
Initial S/W Revision	A.14.00

Trigger Delay

Example	CALC:FPOW:POW1:DEF "TriggerDelay=0.025"
Notes	The trigger delay parameter sets the time after an external trigger is detected until the measurement is performed.
Preset	0 s
Range	0 – 1 s
Default Unit	Seconds
Initial S/W Revision	A.14.00

Trigger Level

Example	CALC:FPOW:POW1:DEF "TriggerLevel=2"
Notes	The trigger level parameter sets the voltage value at which an external trigger is detected.
Preset	1.2 V
Range	–5 to 5 V
Default Unit	Volts
Initial S/W Revision	A.14.00

Trigger Slope

Example	CALC:FPOW:POW1:DEF "TriggerSlope=Negative"
Notes	The trigger slope parameter indicates the direction of the edge trigger voltage for detection.
Preset	Positive
Range	Positive, Negative
Initial S/W Revision	A.14.00

Trigger Source

Example	CALC:FPOW:POW1:DEF "TriggerSource=Ext1"
Notes	The trigger source parameter allows the user to choose between measurement's triggering freely or controlled by an external input. Ext1 and Ext2 correspond to Trigger 1 In and Trigger 2 In, respectively.
Preset	Free
Range	Free, Ext1, Ext2
Initial S/W Revision	A.14.00

Trigger Timeout

Example	CALC:FPOW:POW1:DEF "TriggerTimeout=0.1"
Notes	The trigger timeout parameter sets the time in which the analyzer will wait for a trigger before automatically performing the measurement.
Preset	1 s
Range	0 – 1 s
Default Unit	Seconds
Initial S/W Revision	A.14.00

Signal Input

Example	CALC:FPOW:POW1:DEF "SignalInput=Fp50MHzCW"
Notes	The signal input parameter allows the user to select between using the main RF input or the internal analyzer reference CW signal of 50 MHz.
Preset	FpMainRf
Range	FpMainRf, Fp50MHzCW
Initial S/W Revision	A.14.00

Use Preselector

Example	CALC:FPOW:POW1:DEF "UsePreSelector=True"
Notes	The preselector parameter allows the user to either utilize or bypass the front end tunable filter at frequencies above 3.6 GHz. For frequencies below 3.6 GHz, the preselector is automatically bypassed, so you do not need to set this parameter to False in those cases.
Preset	False
Range	True (use preselector above 3.6 GHz), or False (preselector bypassed)

Default Unit	Boolean
Initial S/W Revision	A.14.00

Channel Bandwidth Array

Example	CALC:FPOW:POW1:DEF "Bandwidth=[3.84e6, 5e6, 3.84e6]"
Notes	The bandwidth parameter array defines the bandwidth of each channel that will be measured. All array parameters should have the same number of elements. Alternatively, if all the elements are the same value, a single number with no square brackets can be used to define the parameter.
Preset	[1e6]
Range	0 to 40 MHz
Default Unit	Hz
Initial S/W Revision	A.14.00

Channel Filter Type Array

Example	CALC:FPOW:POW1:DEF "FilterType=[RRC, IBW, RRC]"
Notes	The filter type parameter allows the user to choose between an integration bandwidth (IBW) filter or a root-raised-cosine (RRC) filter. The integration bandwidth filter weighs all frequencies within the bandwidth equally. The root-raised-cosine filter has an associated shape parameter, defined by the FilterAlpha parameter. All array parameters should have the same number of elements. Alternatively, if all the elements are the same value, a single value with no square brackets can be used to define the parameter.
Preset	[IBW]
Range	IBW, RRC
Initial S/W Revision	A.14.00

Channel Filter Alpha Array

Example	CALC:FPOW:POW1:DEF "FilterAlpha=[0.5, 0.0, 0.5]"
Notes	The filter alpha parameter allows the user to adjust the alpha value associated with the root-raised-cosine (RRC) filter type. Set FilterType to RRC in order to utilize this parameter. All array parameters should have the same number of elements. Alternatively, if all the elements are the same value, a single number with no square brackets can be used to define the parameter.
Preset	[0.22]
Range	0.0 – 1.0
Initial S/W Revision	A.14.00

Channel Measurement Function Array

Example	CALC:FPOW:POW1:DEF "Function=[BandPower, PeakPower, BandPower]"
Notes	This parameter array defines what measurement is being made for each individually-specified channel: BandPower: Total power within the specified bandwidth of the channel (dBm) BandDensity: Total power density within the specified bandwidth of the channel (dBm/Hz) PeakPower: The peak power value within the specified bandwidth of the channel (dBm) PeakFrequency: The frequency which corresponds to the peak power value within the specified bandwidth of the channel. This frequency is relative to the center frequency (Hz) XdBBandwidth: The half power (–3.01 dB) bandwidth of the highest amplitude signal that resides within the channel (Hz), dB is configurable using XdBBandwidth parameter OccupiedBandwidth: The bandwidth at which 99% of the total power resides within the channel (Hz), percentage configurable using OccupiedBandwidthPercent parameter All array parameters should have the same number of elements. Alternatively, if all the elements are the same value, a single value with no square brackets can be used to define the parameter.
Preset	[BandPower]
Range	BandPower, BandDensity, PeakPower, PeakFrequency, XdBBandwidth, OccupiedBandwidth
Initial S/W Revision	A.14.00

Channel Offset Frequency Array

Example	CALC:FPOW:POW1:DEF "OffsetFrequency=[–5e6, 0, 5e6]"
Notes	The offset frequency parameter array defines the difference between the center frequency to the center frequency of each channel. All array parameters should have the same number of elements.
Preset	[0]
Range	0 to 20 MHz
Default Unit	Hz
Initial S/W Revision	A.14.00

Channel Occupied Bandwidth Percent Array

Example	CALC:FPOW:POW1:DEF "OccupiedBandwidthPercent =[0.95, 0.95, 0.95]"
Notes	This parameter only applies for channels whose Function is set to OccupiedBandwidth. The occupied bandwidth percent parameter specifies the percent of total power in these channels. The valid range for this parameter is 0.0 to 1.0, where 1.0 represents 100%. The default for this parameter is 0.99, which will return the bandwidth that contains 99% of the total channel power.

Preset	[0.99]
Range	0 – 1.0
Initial S/W Revision	A.14.00

Channel x-dB Bandwidth Array

Example	CALC:FPOW:POW1:DEF " XdBBandwidth =[–6.02, –3.01, –1.0]"
Notes	This parameter only applies for channels whose Function is set to XdBBandwidth. The X dB bandwidth parameter is used to specify the power relative to the peak channel power over which the bandwidth is calculated. The parameter value must be a negative number.
Preset	[–3.01]
Range	–200 to 0 dB
Default Unit	dB
Initial S/W Revision	A.14.00

Define Fast Power Measurement Query (Remote Command Only)

The DEFine? command is used to retrieve a list of all defined parameters in an ASCII string format

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:DEFine?`
Exam	:CALC:FPOW:POW1:DEF?

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Notes	This command query is used to retrieve a list of all defined parameters in an ASCII format. The following is an example of the returned results: "DCCoupled=False,ElecAttBypass=True,ElecAttenuation=0,IFGain=0,MechAttenuation=0,PreAmpMode=Off,PreSelectorOffset=0,UsePreSelector=False,ExternalReferenceFrequency=10000000,FrequencyReferenceSource=AutoExternalFrequencyReference,IFType=B40M,LOMode=SLW,SignalInput=FpMainRf,AcquisitionTime=0.001,CenterFrequency=1000000000,ResolutionBW=0,ResolutionBWMode=BestSpeed,DetectorType=RmsAverage,Bandwidth=[1000000],OffsetFrequency=[0],Function=[BandPower],FilterType=[IBW],FilterAlpha=[0.22],OccupiedBandwidthPercent=[0.99],XdBBandwidth=[-3.01],DoNoiseCorrection=False,DoSpurSuppression=False,MeasurementMethod=HardwareFFT,IncludePowerSpectrum=False,TriggerDelay=0,TriggerLevel=1.2,TriggerSlope=Positive,TriggerSource=Free,TriggerTimeout=1"
Initial S/W Revision	A.14.00

Configure Fast Power Measurement (Remote Command Only)

The configure command begins hardware setup and returns immediately, with no acquisition made. This can be used in parallel with other hardware operations to effectively hide the hardware setup time.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:CONFigure`
Example	:CALC:FPOW:POW1:CONF
Notes	Option FP2 is required.
Initial S/W Revision	A.14.00

Initiate Fast Power Measurement (Remote Command Only)

The INITiate command begins an acquisition and returns immediately. The results of the measurement can be retrieved using FETCh.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:INITiate`
Example	:CALC:FPOW:POW1:INIT
Notes	Option FP2 is required.
Initial S/W Revision	A.14.00

Fetch Fast Power Measurement (Remote Command Only)

The FETCh command query is used to retrieve the results of an acquisition initiated by the INIT command. The returned results are in ASCII string format. The string begins and ends with quotation marks.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:FETCh?`
Example	:CALC:FPOW:POW1:FETC?
Notes	Option FP2 is required. Returns m comma-separated ASCII values, where m corresponds to the number of bandwidths defined. 1. Declared function return in the 1st specified channel 2. Declared function return in the 2nd specified channel ... m. Declared function return in the last specified channel The INIT and FETC? command sequence performs the same functionality of a single CALC:FPOW:POW[n]? query. Units of the returned values are dependent on the Function parameter for each channel.
Initial S/W Revision	A.14.00

Execute Fast Power Measurement (Remote Command Only)

This command query is used as shorthand for an INIT command immediately followed by a FETC? command. The returned results are in ASCII string format. The string begins and ends with quotation marks.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]?`
Example	:CALC:FPOW:POW1?
Notes	Option FP2 is required. See notes for Fast Power Fetch for return format.
Initial S/W Revision	A.14.00

Binary Read Fast Power Measurement (Remote Command Only)

This command query is used as shorthand for an INIT command immediately followed by a FETC? command. The returned results are in a binary format.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:READ?` `:CALCulate:FPOWer:POWer[1,2,…,999]:READ1?`
Example	:CALC:FPOW:POW1:READ? :CALC:FPOW:POW1:READ1?
Notes	Option FP2 is required. Returns m 4 byte floating point binary values (Little-Endian), where m corresponds to the number of bandwidths defined.
Initial S/W Revision	A.14.00

Diagnostic Binary Read Fast Power Measurement (Remote Command Only)

This command query is used as shorthand for an INIT command immediately followed by a FETC? command. The returned results are in a binary format. This command is used primarily for diagnostic purposes to test for ADC overloads and to visibly inspect the spectrum.

Mode	All
Remote Command	`:CALCulate:FPOWer:POWer[1,2,…,999]:READ2?`
Example	:CALC:FPOW:POW1:READ2?
Notes	Option FP2 is required. Note: Spectrum data is only returned if the IncludePowerSpectrum parameter is set to True. If IncludePowerSpectrum is False, the number of spectrum points will be zero (0). Units of the returned values are dependent on the Function parameter per channel (e.g. dBm for BandPower, Hz for PeakFrequency). Returns binary data (Little-Endian) that contains information on m amount of channels, along with ADC over range and full spectrum data. The following is the binary format of the response. Bandwidth Return Value 1. Number of channels specified, m [4 byte int] 2. Declared function result for the 1st specified channel [4 byte float] 3. Declared function result for the 2nd specified channel [4 byte float] ... (m + 1). Declared function result for the last (mth) specified channel [4 byte float] ADC Over Range 1. ADC over-range occurred (1: true, 0: false) [2 byte short]

	Spectrum Data 1. Number of points in the spectrum data, k [4 byte int] 2. Start frequency of spectrum data (Hz) [8 byte double] 3. Step frequency of spectrum data (Hz) [8 byte double] 4. FFT bin at 1st point (dBm) [4 byte float] 5. FFT bin at 2nd point (dBm) [4 byte float] ... (k + 3). FFT bin at last (kth) point (dBm) [4 byte float]
Initial S/W Revision	A.14.00

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command	`:FORMat[:TRACe][:DATA] ASCii|INTeger,32|REAL,32 |REAL,64` `:FORMat[:TRACe][:DATA]?`
Notes	The query response is: ASCii: ASC,8 REAL,32: REAL,32 REAL,64: REAL,64 INTeger,32: INT,32 When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm). The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.
Dependencies	Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL). Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message –161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message –121 "Invalid Character in Number".
Preset	ASCii
Backwards Compatibility Notes	Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.
Initial S/W Revision	Prior to A.02.00

The specs for each output type follow:

ASCii - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

Remote Command	`:FORMat:BORDer NORMal|SWAPped` `:FORMat:BORDer?`
Preset	NORMal
Initial S/W Revision	Prior to A.02.00

Demod Setup

Displays a menu for adjusting digital demodulation parameters.

Key Path	Meas Setup
Mode	VSA

Custom State Definitions

The states that correspond to each constellation position for each format are defined in the following file:

D:\User_My_Documents\Instrument\My Documents\VSA\data\Constellation\Current.csd

If you want to define custom states, edit this file using Notepad. The file contains instructions and examples to guide you. After saving your changes, you must exit and restart the XSA program for the changes to take effect.

To return the original state definitions, simply delete this file and restart XSA. A new Current.csd file is created with the original state definitions restored.

Key Path	Meas Setup, Demod Setup
Mode	VSA
Remote Command	`[:SENSe]:DDEMod:MODulation BPSK | QPSK | OQPSK | PI4DQPSK | DQPSK | PSK8 | PI8DPSK8 | DPSK8 | QAM16 | QAM32 | QAM64 | QAM128 | QAM256 | QAM512 | QAM1024 | FSK2 | FSK4 | FSK8 | FSK16 | MSK1 | MSK2 | EDGE | APSK16 | APSK32 | DVBAPSK16 | DVBAPSK32 | DVBQAM16 | DVBQAM32 | DVBQAM64 | DVBQAM128 | DVBQAM256 | VSB8 | VSB16 | CPMFM` `[:SENSe]:DDEMod:MODulation?`
Example	DDEM:MOD QPSK DDEM:MOD?
Preset	QPSK
State Saved	Saved in instrument state.
Range	BPSK | QPSK | Offset QPSK | π/4DQPSK | DQPSK | 8PSK | π/8 DPSK8 | D8PSK | QAM 16 | QAM 32 | QAM 64 | QAM 128 | QAM 256 | QAM 512 | QAM 1024 | FSK 2 | FSK 4 | FSK 8 | FSK 16 | MSK Type 1 | MSK Type 2 | EDGE | APSK 16 | APSK 32 | APSK 16 w/DVB | APSK 32 w/DVB | DVB QAM 16 | DVB QAM 32 | DVB QAM 64 | DVB QAM 128 | DVB QAM 256 | VSB 8 | VSB 16 | CPM (FM)

Symbol Rate

Enables you to set the symbol rate (symbols per second) for the analyzer's digital demodulator. Set this parameter to match the symbol rate of your system.

In digital modulation, the symbol rate determines the rate (frequency) at which symbols occur. A symbol can consist of one or more bits as determined by the modulation format. For example, in a BPSK system, each symbol represents 1 bit; in a QPSK system, each symbol represents 2 bits.

Symbols are valid only at the timing instant when the receiver interprets the signal. This timing instant is called the detection-decision point.

The analyzer's demodulator uses the symbol rate to determine the frequency of your detection-decision points. It is important that you set the symbol rate to match exactly the symbol rate of your system, because the symbol clock frequency is not estimated.

Note that the more complex your modulation format, the more critical it is that the symbol rate be exact. Specifying an incorrect symbol rate introduces errors into the demodulation process.

The analyzer can accurately measure symbol rates that are less than the maximum span of the analyzer. There can be instances where you want to set the symbol rate beyond what can be measured. The analyzer lets you do this, but accuracy is not specified

If you enter a symbol rate that is slightly different than the symbol rate of your signal, the EVM (error vector magnitude) is typically small at the center of the result length and increases linearly towards the ends of the result length.

The symbol rate determines the maximum frequency span (information bandwidth) that you can measure. For QAM and PSK signals, the symbol rate also determines the minimum frequency span that meets published specifications.

Key Path	Meas Setup, Demod Setup
Mode	VSA
Remote Command	`[:SENSe]:DDEMod:SRATe <frequency>` `[:SENSe]:DDEMod:SRATe?`
Example	DDEM:SRAT 1 MHZ DDEM:SRAT?
Couplings	Span is forced to be < 15.625 * (Symbol rate)
Preset	3840000 HZ
State Saved	Saved in instrument state.
Min	1
Max	9.9E+37

Meas Interval

Enables you to set the number of symbols that the demodulation will analyze. This and the symbol rate set the overall time record length (in seconds) that is used by the demodulator. It also indirectly sets the resolution bandwidth for the various spectrum results. (The ResBW cannot be set independently.)

Resolution bandwidth and Time length are related by the following equation:

Res BW = ENBW / T

where:

ENBW is the normalized effective noise bandwidth of the Window (see the FFT Window topic for more details).

For the pre-demod Spectrum result, T = 1.2*(Meas Interval)/Symbol Rate.

For the all other Spectrum results, T = (Meas Interval)/Symbol Rate.

The resolution bandwidth is annotated below any spectrum trace. To programmatically query the resolution bandwidth, use the following (with the trace number for <n>):

CALC:DDEM:DATA<n>:HEAD? "ResBW"

Key Path	Meas Setup, Demod Setup
Mode	VSA
Remote Command	`[:SENSe]:DDEMod:SWEep:POINts <integer>` `[:SENSe]:DDEMod:SWEep:POINts?`

Example	DDEM:SWE:POIN 137 DDEM:SWE:POIN?
Preset	200
State Saved	Saved in instrument state.
Min	10
Max	4096

Points / Symbol

Enables you to set how many points are displayed per symbol in time displays of demodulated data. The available values are 1, 2, 4, 5, 10 and 20.

Points/Symbol do not apply to W-CDMA(3GPP) or cdma2000 demodulation.

Minimum (except OQPSK):	1 point per symbol
Minimum (OQPSK):	2 points per symbol
Maximum:	20 points per symbol
EDGE default (see below):	1 point per symbol

For example, if the value of Points/Symbol is 1, each display point corresponds to a symbol. If the value is 5, the 5th display point corresponds to a symbol–in this case, an IQ diagram would show 4 display points between each symbol.

Saving Points/Symbol: When you save a digitally demodulated trace, the Points/Symbol value used to create the trace is saved with the trace. When you recall the trace, the analyzer displays the trace with the Points/Symbol value used to create the trace–the analyzer DOES NOT use the current value of Points/Symbol.

MSK Demodulation: For the MSK demodulation format, changing Points/Symbol affects the error data. This occurs because the analyzer uses all points to compute Error data results for MSK, whereas the analyzer uses only the points that occur at the symbol times to compute error data results for other demodulation formats.

OQPSK Demodulation: For OQPSK, an even number of Points/Symbol are required due to the offset between I and Q. If you specify an odd value for Points/Symbol, the analyzer chooses the next, lower, even value.

EDGE demodulation: For EDGE demodulation format with Points/Symbol set to 1 (default), the IQ Meas Time, IQ Magnitude Error, IQ Phase Error, and Error Summary Table trace data results are the ISI (inter-symbol interference) compensated values. That is, when the points/symbol is set to 1 (default), the analyzer removes the effects of ISI (inter-symbol interference), which provides a "clean" IQ Meas Time constellation diagram. For points/symbol greater than one, the trace data results are not compensated for the effects of ISI. For values greater than 1 point/symbol, the symbols in EDGE constellation diagrams can appear randomly placed due to the effects of ISI.

Couple to Gain Imb./Quad Skew: This measurement parameter selection controls the number of points per symbol used to calculate the IQ Gain Imbalance and Quadrature Skew symbol error data results. For further information, see "Gain Imb/Quad Skew Coupling " on page 720.

Key Path	Meas Setup, Demod Setup
Mode	VSA
Remote Command	`[:SENSe]:DDEMod:PPSYmbol <integer>` `[:SENSe]:DDEMod:PPSYmbol?`
Example	DDEM:PPSY 2 DDEM:PPSY?
Notes	The only supported values are 1, 2, 4, 5, 10 and 20. Numeric entries are rounded to the nearest valid value.
Preset	5
State Saved	Saved in instrument state.
Min	1
Max	20

Gain Imb/Quad Skew Coupling

Controls what measurement data is included in the Quadrature Skew Error and IQ Gain Imbalance error data calculations.

- Off: Calculations use one Point per Symbol.
- On: Calculations use the value shown in the Points per Symbol parameter box.

Key Path	Meas Setup, Demod Setup
Mode	VSA
Remote Command	`:CALCulate:DDEMod:PPSYmbol:COUPle OFF|ON|0|1` `:CALCulate:DDEMod:PPSYmbol:COUPle?`
Example	CALC:DDEM:PPSY:COUP OFF CALC:DDEM:PPSY:COUP?
Couplings	No
Preset	OFF
State Saved	Saved in instrument state.

Meas Filter

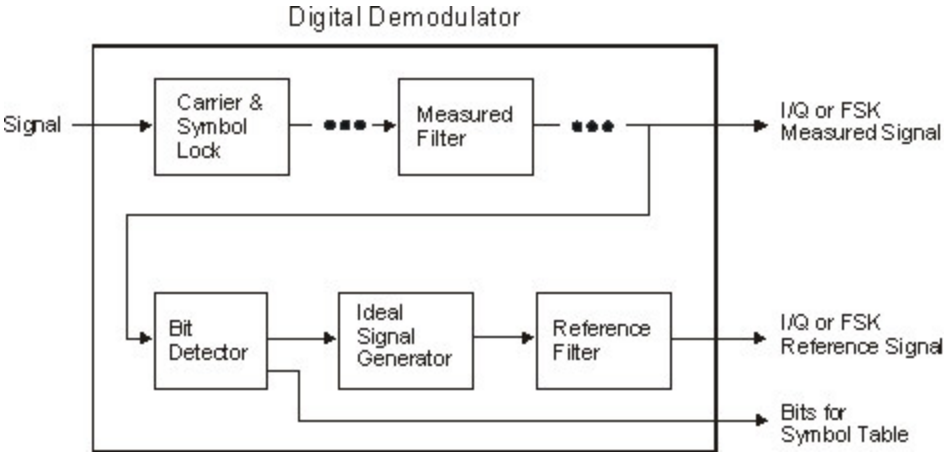
Displays a menu for selecting the Meas Filter used by the receiver.

Data filtering is used in digital demodulation to limit bandwidth and reduce intersymbol interference. This analyzer includes several commonly used filter types and has the ability to apply user-defined filters. All filters are computed to 20 symbols in length. If the filter alpha is < 0.2, the analyzer uses 40 symbols to compute filter length (for most formats).

The shape and width of a filter is defined by the alpha (for cosine filters) or the BT (for Gaussian filters). The alpha or BT indicates the filter roll-off (or excess bandwidth) of the selected filter that occurs due to the practical inability of filter technology to build a perfectly square (brick-wall) filter that would have an alpha of 0 (no excess bandwidth). For example, a typical filter with an alpha of 0.3 has a bandwidth 30% greater than the theoretical minimum.

The analyzer's digital demodulator produces two signals: a measured and a reference signal. These signals are called I/Q Measured and I/Q Reference or, for FSK measurements, FSK Measured and FSK Reference.

You can select different filters for the measured and reference signals, as shown in the following generic block diagram.



Note that for FSK signals, filtering is baseband and occurs after the FM demodulator.

The measured signal is the signal that results after demodulating your waveform. The reference signal is the signal that would result after demodulating your signal if your signal were ideal (contained no errors).

Notice that there are separate filters for the measured and reference signals. You MUST select the correct filter for both signals.

Filtering for various communication systems can occur either at the transmitter or the receiver; or the filtering can be distributed between the transmitter and the receiver. This is an important concept that affects your filter selection for the measured and reference signals. The analyzer's measured filter represents filtering in the system's receiver while the reference filter represents filtering in the entire system. Both filters share the same alpha/BT. The following table shows some examples of filter selection:

If the transmitter filter is:	The measure filter should be:	The reference filter should be:
root raised cosine	root raised cosine	raised cosine
Raised cosine	none	raised cosine
Gaussian	none	Gaussian
any type	user defined	any type

You can modify the shape and width of Gaussian and Nyquist (cosine) filters. The shape and width is defined by the alpha (for cosine filters) or the BT (for Gaussian filters). All filters are computed to 20 symbols in length. If the filter alpha is < 0.2, the analyzer uses 40 symbols to compute filter length (for most formats).

Key Path	Meas Setup, Demod Setup
Mode	VSA
Remote Command	`[:SENSe]:DDEMod:FILTer:MEASurement NONE | RRCosine | GAUSsian | EDGE | IS95EQ | RECTangle | LPASs | USER` `[:SENSe]:DDEMod:FILTer:MEASurement?`
Example	DDEM:FILT:MEAS RRC DDEM:FILT:MEAS?
Notes	USER defined requires you to specify a register (see Meas User Defined).
Preset	RRC
State Saved	Saved in instrument state.
Range	No Filter | Root Raised Cosine | Gaussian | EDGE | CDMA (IS-95A Base EQ) | Rectangular | Low Pass | User Defined
Readback Text	No Filter | RRC | Gaussian | EDGE | CDMA (EQ) | Rectangular | Low Pass | User Defined

Ref Filter

Pressing this key selects the Ref Filter that represents the cascaded transmit and receive filter.

This analyzer includes several commonly used filter types and has the ability to apply user-defined filters. All filters are computed to 20 symbols in length. If the filter alpha is < 0.2, the analyzer uses 40 symbols to compute filter length (for most formats).

The shape and width of a filter is defined by the alpha (for cosine filters) or the BT (for Gaussian filters). The alpha or BT indicates the filter roll-off (or excess bandwidth) of the selected filter that occurs due to the practical inability of filter technology to build a perfectly square (brick-wall) filter that would have an alpha of 0 (no excess bandwidth). For example, a typical filter with an alpha of 0.3 has a bandwidth 30% greater than the theoretical minimum.

The analyzer's digital demodulator produces two signals: a measured and a reference signal. These signals are called I/Q Measured and I/Q Reference or, for FSK measurements, FSK Measured and FSK Reference. The following table shows some examples of filter selection:

If the transmitter filter is:	The measure filter should be:	The reference filter should be:
root raised cosine	root raised cosine	raised cosine
raised cosine	none	raised cosine
Gaussian	none	Gaussian
any type	user defined	any type

You can modify the shape and width of Gaussian and Nyquist (cosine) filters. The shape and width is defined by the alpha (for cosine filters) or the BT (for Gaussian filters). All filters are computed to 20 symbols in length. If the filter alpha is < 0.2, the analyzer uses 40 symbols to compute filter length (for most formats).

Matched filtering of a demodulated signal is not available with the MSK demodulators. The measured filter is normally off. A user defined filter can be selected. Its primary use is for additional band-limiting and channel equalization.

Key Path	Meas Setup, Demod Setup
Mode	VSA
Remote Command	`[:SENSe]:DDEMod:FILTer:REFerence RCOSine | RRCosine | GAUSsian | EDGE | IS95BB | RECTangle | HSINe | USER | F1REC | F3RC` `[:SENSe]:DDEMod:FILTer:REFerence?`
Example	DDEM:FILT:REF RCOS DDEM:FILT:REF?
Notes	Reference filter types that are not available for a particular selection of modulation format are greyed out . Individual Data register selections are greyed out if they do not contain appropriate data for use as filter coefficients. USER defined requires you to specify a register (see Ref User Defined).
Preset	RCOS
State Saved	Saved in instrument state.
Range	Raised Cosine | Root Raised Cosine | Gaussian | EDGE | CDMA (IS-95 Base) | Rectangular | Half Sine | User Defined | 1REC (CPM) | 3RC (CPM)
Readback Text	Raised Cosine | RRC | Gaussian | EDGE | CDMA (Base) | Rectangular | Half Sine | User Defined | 1REC | 3RC

Alpha / BT

Determines the filter characteristics of the Raised cosine, Root-raised cosine and Gaussian filters used by the analyzer's digital demodulator. These characteristics apply to both the Meas and Ref filters.

Allowable values,

Raised cosine, root-raised cosine filters: .05 to 1

Gaussian filters: .05 to 100

Key Path	Meas Setup, Demod Setup
Mode	VSA
Remote Command	`[:SENSe]:DDEMod:ALPHa <real>` `[:SENSe]:DDEMod:ALPHa?`
Example	DDEM:ALPH 0.22 DDEM:ALPH?
Couplings	Alpha also determines length criteria for user defined meas and ref filters

Preset	0.22
State Saved	Saved in instrument state.
Min	0.05
Max	100

Burst/Sync Search

Displays a menu for selecting Burst and Sync searches, and to select search parameters for the current measurement.

Key Path	Meas Setup, Demod Setup
Mode	VSA

Search Length

Defines the time length that the analyzer searches for a burst and/or sync word. You can specify search length in number of symbols or units of time.

Key Path	Meas Setup, Demod Setup, Burst/Sync Search
Mode	VSA
Remote Command	`[:SENSe]:DDEMod:SYNC:SLENgth <time>` `[:SENSe]:DDEMod:SYNC:SLENgth?`
Example	DDEM:SYNC:SLEN 200 US DDEM:SYNC:SLEN?
Couplings	Minimum: Meas Interval / Symbol Rate Maximum: Depends on span
Preset	666.666667E-6
State Saved	Saved in instrument state.
Min	0
Max	9.9E+37

Burst Search

Turns burst search on or off.

Key Path	Meas Setup, Demod Setup, Burst/Sync Search
Mode	VSA
Remote Command	`[:SENSe]:DDEMod:SYNC:BURSt:STATe OFF|ON|0|1` `[:SENSe]:DDEMod:SYNC:BURSt:STATe?`

Example	DDEM:SYNC:BURS:STAT OFF DDEM:SYNC:BURS:STAT?
Preset	OFF
State Saved	Saved in instrument state.

Sync Search

Turns Sync Word search on or off. Sync search enables you to use a synchronization pattern to isolate a segment of your signal for display and analysis. The analyzer searches through demodulated data to find your sync pattern, and then uses the Result Length to determine how much data to display and the Search Offset to display data relative to the sync pattern.

NOTE The sync pattern must be a multiple of the number of bits-per-symbol. For example, if the number of bits-per-symbol is 4 (as with 16 QAM), then the number of bits in the sync pattern must be a multiple of four. Sync search lets you specify any number of bits for the sync pattern; however, bits that are not a multiple of the bits-per-symbol are truncated.

Key Path	Meas Setup, Demod Setup, Burst/Sync Search
Mode	VSA
Remote Command	`[:SENSe]:DDEMod:SYNC:SWORd:STATe OFF|ON|0|1` `[:SENSe]:DDEMod:SYNC:SWORd:STATe?`
Example	DDEM:SYNC:SWOR:STAT OFF DDEM:SYNC:SWOR:STAT?
Preset	OFF
State Saved	Saved in instrument state.

Sync Pattern

Enables you to define a bit pattern for the sync word search. The maximum length of the pattern is 32 symbols. When you press this key, an editor dialogappears that enables you to define the pattern in binary or hexadecimal.

The analyzer can only search for search patterns that are a multiple of the number of bits-per-symbol. The analyzer assembles the bits in the search pattern into an integer number of symbols, ignoring any trailing bits that cannot complete a full symbol.

For example, if the number of bits-per-symbol is 4 (as with 16 QAM), and your search pattern contains 18 bits, the analyzer only uses the first 16 bits during sync search and ignores the last two bits.

Although the underlying sync pattern is binary, the editor enables you to enter bit patterns in either binary or hexadecimal.

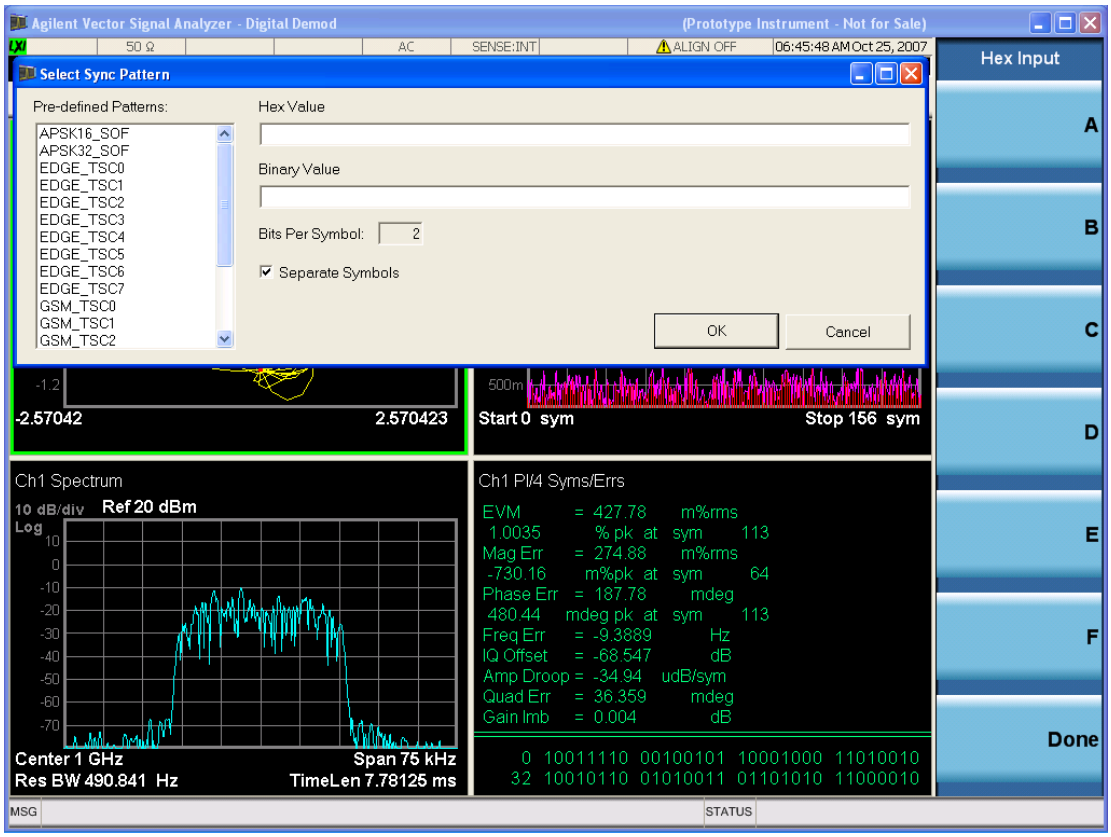
Hexadecimal entries are in symbol table hex format. In this format, each symbol is represented by 1 to 3 hex digits. The least significant bits make up the symbol and any extra bits are ignored. Thus, for 6 bits per symbol, the binary value of 101101 is encoded in hex as 2D. If you enter AD as the symbol value, it is

converted to the same binary value as 2D because the upper 2 bits are ignored. 3-bit-wide symbols are represented by 1 hex digit with the most significant bit ignored.

Predefined sync patterns are available for GSM/EDGE and APSK. If you choose one of these formats from the list, it populates the sync pattern hex and binary text boxes with their predefined value.

When Separate Symbols is turned on, spaces appear between symbols in the binary representation.

You can navigate around the dialog without needing a mouse. Pressing tab right and tab left moves you from one control to the next. Arrow keys and the knob can be used to navigate within a list or editing box. The space key toggles the Separate Symbols check box on and off. Softkeys and the numeric entry keys are used to enter patterns. Press Select or Done to complete the entry. Cancel or Return exits the dialog without changing the pattern.



Key Path	Meas Setup, Demod Setup, Burst/Sync Search
Mode	VSA
Remote Command	`[:SENSe]:DDEMod:SYNC:SWORd:PATTern <string>` `[:SENSe]:DDEMod:SYNC:SWORd:PATTern?`
Example	DDEM:SYNC:SWOR:PATT '1011010' DDEM:SYNC:SWOR:PATT?
Notes	<string> must be a string of 1s and 0s only. The maximum string length is 320 bits.
Preset	=""
State Saved	Saved in instrument state.

Sync Offset

Specifies the time (in symbols) between the start of the measurement data and the start of the sync word. If positive, the sync word starts after the start of the measurement data. If negative, the sync word starts before the start of the measurement data.

The minimum and maximum offsets you can enter depend on these parameters:

Search Length

Result Length

Sync Pattern

Basically, you can enter any offset such that the result length falls within the search length. Increasing any of these parameters affects the maximum positive or negative offset that you can enter as follows:

Increasing search length increases the maximum positive or negative offset that you can enter.

Increasing result length decreases the maximum negative offset that you can enter but has no effect on the maximum positive offset.

Increasing the length of the sync pattern decreases the maximum positive offset that you can enter but has no effect on the maximum negative offset.

Key Path	Meas Setup, Demod Setup, Burst/Sync Search
Mode	VSA
Remote Command	`[:SENSe]:DDEMod:SYNC:SWORd:OFFSet <integer>` `[:SENSe]:DDEMod:SYNC:SWORd:OFFSet?`
Example	DDEM:SYNC:SWOR:OFFS –3 DDEM:SYNC:SWOR:OFFS?
Couplings	Max and min constrained by Search Length, Sync Pattern length
Preset	0
State Saved	Saved in instrument state.
Min	see coupling
Max	see coupling

Advanced Dig Demod

Displays a menu for selecting advanced demodulation parameters for the current measurement. These settings are for advanced users and do not normally require adjustment for most common measurements.

Key Path	Meas Setup, Demod Setup
Mode	VSA

Clock Adjust

Enables you to adjust symbol clock timing in fractions of a symbol. The adjustment is relative to the symbol clock time that is computed by the demodulation algorithm. Some digital communications systems contain nonlinearities that can bias the digital demodulator's estimation of the symbol clock position. You can use clock adjust to compensate for this offset and obtain a lower EVM (Error Vector Magnitude).

Specifying a clock adjust only affects the I/Q measured trace. It does not affect the I/Q reference trace.

Use the eye diagram with an eye length of one (1) to observe the accuracy of the symbol clock timing. You can also monitor the EVM (Error Vector Magnitude) in the symbol table summary while adjusting clock adjust to obtain the optimum symbol timing.

Clock adjust is reset to 0.0 on power-up or when you select Preset.

Key Path	Meas Setup, Advanced Dig Demod
Mode	VSA
Remote Command	`[:SENSe]:DDEMod:CADJust <real>` `[:SENSe]:DDEMod:CADJust?`
Example	DDEM:CADJ 0.14 DDEM:CADJ?
Notes	The parameter is interpreted as a fraction of a sample
Preset	0
State Saved	Saved in instrument state.
Min	–0.5
Max	0.5

IQ Rotation

Rotates the Meas/Ref Time data and corresponding ideal state positions by a user defined amount ranging from –360 degrees to 360 degrees. The Rotation parameter affects the IQ Gain Imbalance and Quadrature Skew error data results.

Key Path	Meas Setup, Advanced Dig Demod
Mode	VSA
Remote Command	`:CALCulate:DDEMod:IQRotation <real>` `:CALCulate:DDEMod:IQRotation?`
Example	CALC:DDEM:IQR 45 CALC:DDEM:IQR?
Notes	The numeric parameter is interpreted as degrees.
Preset	0
State Saved	Saved in instrument state.
Min	–360
Max	360

IQ Normalize

Turns IQ Normalize on and off. When IQ Normalize is on, the Meas Time and Ref Time data is normalized so the extreme points have a value of 1. For quadrature modulation types, the outermost points of the constellation are normalized to 1. (Note, for non-square QAM constellation, the points that appear at the corners of the containing square are normalized to 1.) For FSK constellations, the deviation is normalized to 1.

When IQ Normalize is turned off, the actual data values based on the input signal level are plotted on the constellation.

When normalization is ON, the analyzer normalizes or scales the demodulated trace data results to a nominal value of 1. Normalization is performed on these traces:

IQ measured time for Digital, WCDMA, cdma2000, TD-SCDMA and 1xEV-DO demodulation.

IQ reference time for Digital, WCDMA, cdma2000, TD-SCDMA and 1xEV-DO demodulation.

Error vector time

FSK measured time (FSK measurements)

FSK measured reference (FSK measurements)

Carrier error magnitude (FSK measurements)

FSK error (FSK measurements)

CDP and CDE measurements for W-CDMA, cdma2000 1xEV-DO and TD-SCDMA demodulation)

Key Path	Meas Setup, Advanced Dig Demod
Mode	VSA
Remote Command	`:CALCulate:DDEMod:NORMalize OFF|ON|0|1` `:CALCulate:DDEMod:NORMalize:?`
Example	CALC:DDEM:NORM ON CALC:DDEM:NORM?
Preset	ON
State Saved	Saved in instrument state.

APSK R2 / R1

Enables you to specify the expected ratio between the two inner rings for APSK modulation formats.

APSK R2 / R1 determines the Ring 2 to Ring 1 ratio for APSK format measurements.

The ring ratio is the ratio of the magnitude of symbol states on a ring (R2) to the magnitude of symbol states on the inner ring (R1). R2 / R1 is a valid parameter for both 16 APSK and 32 APSK format measurements.

Key Path	Meas Setup, Advanced Dig Demod

Mode	VSA
Remote Command	`[:SENSe]:DDEMod:APSK:R2Ratio <real>` `[:SENSe]:DDEMod:APSK:R2Ratio?`
Example	DDEM:APSK:R2R 3 DDEM:APSK:R2R?
Notes	Affects the position of the ideal state indicators on constellation diagrams
Preset	2.84
State Saved	Saved in instrument state.
Min	1.25
Max	8

APSK R3 / R1

Enables you to specify the expected ratio between the outer and inner rings for APSK32 modulation formats.

APSK R3 / R1 determines the Ring 3 to Ring 1 ratio for APSK format measurements.

The ring ratio is the ratio of the magnitude of symbol states on a ring (R3) to the magnitude of symbol states on the inner ring (R1). R3 / R1 is a valid parameter only for 32 APSK format measurements.

Key Path	Meas Setup, Advanced Dig Demod
Mode	VSA
Remote Command	`[:SENSe]:DDEMod:APSK:R3Ratio <real>` `[:SENSe]:DDEMod:APSK:R3Ratio?`
Example	DDEM:APSK:R3R 5 DDEM:APSK:R3R?
Notes	Affects the position of the ideal state indicators on constellation diagrams
Preset	5.27
State Saved	Saved in instrument state.
Min	1.5625
Max	10

Low SNR Enhancement

Enhances the ability of the demodulator to lock on to signals with low SNR. This process reduces the frequency lock range and provides additional filtering. This filtering enables the demodulator to lock in the presence of more. To compensate for the smaller frequency lock range, the frequency estimate is tracked from measurement to measurement. An exponential average is used and the output of this average becomes the starting point for the next frequency estimate for the next measurement.

This enhancement is only available for the following modulation formats:

- All QAM and DVB QAM formats
- BPSK, QPSK, and 8PSK
- All APSK (amplitude/phase shift keying) and DVB APSK formats
- EDGE

Key Path	Meas Setup, Advanced Dig Demod
Mode	VSA
Remote Command	`[:SENSe]:DDEMod:LSNR OFF|ON|0|1` `[:SENSe]:DDEMod:LSNR?`
Example	DDEM:LSNR OFF DDEM:LSNR?
Notes	Softkey is greyed out for formats not supported.
Preset	OFF
State Saved	Saved in instrument state.

CPM Index

Sets the value of the modulation indices, h1 and h2 when the CPM(FM) modulation format is selected. The modulation indices determine the amount of phase change for each symbol.

The modulation indices can also be auto-detected by selecting the CPM Index Auto

Key Path	Meas Setup, Advanced Dig Demod
Mode	VSA

Remote Command	`[:SENSe]:DDEMod:CPMIndex I12I13 | I7I10 | I6I7 | I5I6 | I4I5 | MSK | HCPM`
	`[:SENSe]:DDEMod:CPMIndex?`
	`[:SENSe]:DDEMod:CPMIndex:AUTO ON|OFF|1|0`
	`[:SENSe]:DDEMod:CPMIndex:AUTO?`

Example	DDEM:CPMI DDEM:CPMI? DDEM:CPMI:AUTO ON DDEM:CPMI:AUTO?
Notes	Applies only when CPM modulation format is selected.
Preset	4/16,5/16 OFF
State Saved	Saved in instrument state.
Range	Auto | 12/16,13/16 | 7/16,10/16 | 6/16,7/16 | 5/16,6/16 | 4/16,5/16 | 1/2 (MSK) | 1/3 (HCPM)

FSK Dev Ref

Sets the value of the FSK deviation reference when the FSK(2FSK/4FSK/8FSK/16FSK) modulation format is selected.

There are two possible FSK Deviation Reference modes:

- Manual: This selection enables the user to manually set the deviation reference. When a Preset to Standard FSK format is selected (e.g., Wi-SUN 2-FSK 50/1), the Manual field is populated with a deviation that is calculated using the format's data rate and modulation index.
- Automatic: This selection uses an average measured frequency deviation.

Key Path	Meas Setup, Demod Setup, Advanced Dig Demod

Remote Command	`[:SENSe]:DDEMod:FSK:DEViation:REFerence <freq>`
	`[:SENSe]:DDEMod:FSK:DEViation:REFerence?`
	`[:SENSe]:DDEMod:FSK:DEViation:REFerence:AUTO OFF|ON|0|1`
	`[:SENSe]:DDEMod:FSK:DEViation:REFerence:AUTO?`

Example	DDEM:FSK:DEV:REF 250 kHz
Couplings	When modulation format is not FSK(2FSK/4FSK/8FSK/16FSK), this key will be grey out. When the user manually changes the FSK Deviation Reference, this set automatically goes to 'Man'.
Preset	Auto, 0 Hz
State Saved	Saved in instrument state
Min	0
Max	1.79769e+308
Default Unit	Hz
Initial S/W Revision	A.14.00

Preset to Standard

Displays a menu for selecting preset Digital Demod Setup parameters and Span for measuring a wide variety of standard digital communications formats. Preset to Standard does not prevent you from afterward making adjustments to measurement parameters. The following standard presets are available:

- Cellular: IS–95 Base and Mobile, GSM, EDGE, CDPD, NADC, PDC, PHP, 3GPP (W-CDMA)
- Wireless Networking: 802.11b, HIPERLAN/1 (HBR and LBR), Bluetooth, ZigBee 868/915/2450, and Wi-SUN.

NOTE For Wi-SUN conformance test:
FSK Dev Ref (Meas Setup, Demod Setup, Advanced Dig Demod) should be set to Auto.
Frequency deviation error = "DevOffset" in Syms/Errs window.
Zero crossing offset = "ZeroCrErr" in Syms/Errs window.
Frequency offset = "Carr Ofst" in Syms/Errs window; this is in Hz and needs to divide by center frequency to get value in ppm.

- Digital Video: DTV8, DTV16, DVB16, DVB32, DVB64, DVB128, DVB256, DVB 16APSK with code rates 2/3 to 9/10, DVB 32 APSK with code rates 3/4 to 9/10.
- Other: APCO 25, DECT, TETRA, VDL Mode 3, HCPM (APCO 25 P2) , HDQPSK (APCO 25 P2), MIL-STD CPM (188–181C Opt21), SOQPSK-TG

Key Path	Meas Setup
Mode	VSA
Remote Command	`[:SENSe]:DDEMod:STANdard:PRESet CDMABTS | CDMAMS | CDPD | EDGE | GSM | NADC | PDC | PHS | WCDMA | BLUETOOTH | HIPERLANHBR | HIPERLANLBR | WLAN11B | ZIGBEE2450 | ZIGBEE868 | ZIGBEE915 | DTV8 | DTV16 | DVB16 | DVB32 | DVB64 | DVB128 | DVB256 | DVB16APSK23 | DVB16APSK34 | DVB16APSK45 | DVB16APSK56 | DVB16APSK89 | DVB16APSK910 | DVB32APSK34 | DVB32APSK45 | DVB32APSK56 | DVB32APSK89 | DVB32APSK910 | APCO | DECT | TETRA | VDL3 | HCPM | HDQPSK | MILSTDCPM | WS2F50K1 | WS2F100K1 | WS2F100K05 | WS2F150K05 | WS2F200K1 | WS2F200K05 | WS2F300K05`
Example	DDEM:STAN:PRES CDMABTS

Adaptive Equalizer Setup

Displays a menu for selecting Adaptive Equalizer parameters for the current measurement. Adaptive equalization removes linear errors from modulated signals by dynamically creating and applying a FIR (feed-forward) compensating filter. Linear errors can come from filters in a transmitter or receiver's IF, or from the presence of multiple paths in the transmission path, such as reflections in a cable system. These types of problems appear as group-delay distortion, frequency-response errors (tilt, ripple), and reflections or multipath distortion.

Equalization enables measurement of some impaired channels and can be used to isolate linear from nonlinear error mechanisms. Equalization does not require symbol lock or prior knowledge of the signal (such as a training sequence) and is compatible with recorded data.

By default, the equalization filter has a unit impulse response that yields a flat frequency response (only one tap in the filter has a non-zero value and data simply passes through the filter). The position of the unit impulse is a function of the filter length and is positioned to provide the most optimum efficiency for most situations. The position cannot be adjusted.

The equalization filter has a unit impulse response when you:

first run the application

reset the equalizer filter

change points/symbol

change the measured or reference filter

change the symbol rate

change the clock delay adjustment

change the equalizer filter length

preset the application

Aside from the above conditions, the application uses the last computed coefficients when you enable equalization. For example, if you used equalization in a previous measurement, the application uses the coefficients from the previous measurement unless you reset the equalization filter or change points/symbol. Therefore, it is good practice to reset the equalization filter to initialize the filter coefficients before you start a measurement.

Key Path	Meas Setup
Mode	VSA

Filter

Turns the adaptive equalization filter on or off. Adaptive equalization uses the measured signal to determine the coefficients of the equalization filter.

When equalization is on, the equalization filter has a unit impulse response. The length of the filter determines the position of the unit impulse response in the filter. The impulse is located in the center of the filter for short filter lengths. As the filter length increases, the impulse moves, proportionally, towards the start of the filter to handle channels with large delay-spread.

If Adaptive is set to run, the analyzer uses the results of the current measurement to update the filter coefficients for the next measurement. The analyzer chooses coefficients that produce a modulation quality metric that is less impacted by the presence of linear distortion.

If Adaptive is set to hold, the analyzer does not update the filter coefficients. Instead, the analyzer uses the last updated coefficients before selecting hold.

You can select run or hold at any time to continue or stop updating filter coefficients.

Note that the analyzer does not redefine the equalization filter to have a unit impulse response when you select run or when you turn the equalization filter off and then on; instead, the analyzer uses the last updated filter coefficients.

Equalization is applied to time-domain data.

For best results, make sure you select a frequency span that contains all the energy of your signal. If significant energy from your signal falls outside of the displayed frequency span, equalization will not work on your signal.

You can define the length of the equalization filter (in symbols) and set the convergence (convergence determines the size of the steps used to reshape the equalization filter). For additional details about these parameters, see online help for "Convergence" on page 736 and "Filter Length" on page 735.

You can use equalization with "Sync Search" on page 725. Note, however, that the adaptive equalizer does not update the filter coefficients when a "Sync Not Found" condition exists. In other words, if sync search is on and the measurement results in a "sync not found" message, the results of that measurement do not affect the equalization filter coefficients.

The following parameters affect measurement speed when using adaptive equalization:

result length

filter length (for the equalization filter)

points/symbol

Key Path	Meas Setup, Adaptive Equalizer Setup
Mode	VSA
Remote Command	`[:SENSe]:DDEMod:EQUalization:STATe OFF|ON|0|1` `[:SENSe]:DDEMod:EQUalization:STATe?`
Example	DDEM:EQU:STAT ON DDEM:EQU:STAT?
Preset	OFF
State Saved	Saved in instrument state.

Filter Length

Sets the length (in symbols) for the analyzer's equalization filter.

In general, the best filter length is the smallest that meets your measurement requirements. For measurements at the transmitter, the filter length may only need to be a few symbols in length. Longer filter lengths may be needed to measure multi-path environments.

The filter length also determines the placement of the impulse response in the equalization filter. For longer filter lengths, the analyzer puts the initial, unit impulse response closer to the beginning of the time record to accommodate multi-path measurements, as follows:

Filter Length	Unit Impulse Response Position
(symbol)	(symbol)
3 to 31	(length – 1)/2
31 to 75	15
75 to 99	(length)/5

For example, if the filter length is 11, the unit impulse response is positioned at symbol 5. If the filter length is 35, the unit impulse response is positioned at symbol 15.

Key Path	Meas Setup, Adaptive Equalizer Setup
Mode	VSA
Remote Command	`[:SENSe]:DDEMod:EQUalization:FLENgth <integer>` `[:SENSe]:DDEMod:EQUalization:FLENgth?`
Example	DDEM:EQU:FLEN 31 DDEM:EQU:FLEN?
Notes	Must be an odd number. If an even number is entered, it is rounded up to the next odd.
Preset	21
State Saved	Saved in instrument state.
Min	3
Max	99

Convergence

Sets the adaptive filter convergence factor higher to converge faster. Note that too high a value can cause the filter to not converge. Set convergence factor smaller for better accuracy.

NOTE The convergence value is normalized relative to the value shown in the 89600 VSA software. To convert the value in 89600 to the normalized value multiply times 1e+07.

Key Path	Meas Setup, Adaptive Equalizer Setup
Mode	VSA
Remote Command	`[:SENSe]:DDEMod:EQUalization:CONVergence <real>` `[:SENSe]:DDEMod:EQUalization:CONVergence?`
Example	DDEM:EQU:CONV 2 DDEM:EQU:CONV?
Preset	1
State Saved	Saved in instrument state.
Min	0
Max	10000000

Hold

Turns the filter coefficient updates on or off. Normally the adaptation algorithm updates the filter coefficients after each scan. When Hold is on, the coefficients of the equalization filter are frozen; that is, the adaptive filter becomes fixed. When you turn Hold off again, the coefficients are again allowed to adapt, starting from where they currently are.

Key Path	Meas Setup, Adaptive Equalizer Setup
Mode	VSA
Remote Command	`[:SENSe]:DDEMod:EQUalization:HOLD OFF|ON|0|1` `[:SENSe]:DDEMod:EQUalization:HOLD?`
Example	DDEM:EQU:HOLD ON DDEM:EQU:HOLD?
Preset	OFF
State Saved	Saved in instrument state.

Reset Filter Coefficients

Resets the adaptive filter coefficients to 1.

Key Path	Meas Setup, Adaptive Equalizer Setup

Mode	VSA
Remote Command	`[:SENSe]:DDEMod:EQUalization:RESet`
Example	DDEM:EQU:RES

Meas Preset

Performs the same function as Meas Setup, Preset to Standard, Cellular, More, W-CDMA.

Key Path	Meas Setup
Mode	VSA
Remote Command	`:CONFigure:DDEMod`
Example	CONF:DDEM

Mode

See "Mode" on page 152

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings
- See "How-To Preset" on page 740 for more information.

Key Path	Front-panel key
Remote Command	`:SYSTem:PRESet`
Example	:SYST:PRES
Notes	*RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0.
Couplings	A Mode Preset aborts the currently running measurement, activates the default measurement, and. gets the mode to a consistent state with all of the default couplings set.
Backwards Compatibility Notes	In the X-Series, the legacy “Factory Preset” has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no “Preset Type” as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using

	User Preset.
Initial S/W Revision	Prior to A.02.00

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

Type Of Preset	SCPI Command	Front Panel Access
Auto Couple	:COUPle ALL	Auto Couple front-panel key
Meas Preset	:CONFigure:<Measurement>	Meas Setup Menu
Mode Preset	:SYSTem:PRESet	Mode Preset (green key)
Restore Mode Defaults	:INSTrument:DEFault	Mode Setup Menu
Restore All Mode Defaults	:SYSTem:DEFault MODes	System Menu; Restore System Default Menu
*RST	*RST	not possible (Mode Preset with Single)
Restore Input/Output Defaults	:SYSTem:DEFault INPut	System Menu; Restore System Default Menu
Restore Power On Defaults	:SYSTem:DEFault PON	System Menu; Restore System Default Menu
Restore Alignment Defaults	:SYSTem:DEFault ALIGn	System Menu; Restore System Default Menu
Restore Miscellaneous Defaults	:SYSTem:DEFault MISC	System Menu; Restore System Default Menu
Restore All System Defaults	:SYSTem:DEFault [ALL] :SYSTem:PRESet:PERSistent	System Menu; Restore System Default Menu
User Preset	:SYSTem:PRESet:USER	User Preset Menu
User Preset All Modes	:SYSTem:PRESet:USER:ALL	User Preset Menu

Power On Mode Preset	:SYSTem:PON:TYPE MODE	System Menu
Power On User Preset	:SYSTem:PON:TYPE USER	System Menu
Power On Last State	:SYSTem:PON:TYPE LAST	System Menu

Mode Setup

See "Mode Setup" on page 171

Print

See "Print" on page 181

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

Type	Default Prefix	Menu
State	State_	(Save/Recall)
Trace + State	State_	(Save/Recall)
Screen	Screen_	(Save/Recall)
Amplitude Corrections	Ampcor_	(Import/Export)
Traces	Trace_	(Import/Export)
Limit Lines	LLine_	(Import/Export)
Measurement Result	MeasR_	(Import/Export)
Capture Buffer	CapBuf_	(Import/Export)

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file.The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as “fred.csv”, then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

.

NOTE If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

Key Path	Front-panel key
Notes	No remote command for this key specifically.
Initial S/W Revision	Prior to A.02.00

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are States andTraces. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

NOTE In products that run multiple instances of the X-Series Application, all instances share the same register and file location where you want to recall from.

The default paths for Recall are data type dependent and are the same as for the Save key.

Key Path	Front-panel key
Notes	No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATe <filename>. If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.
Backwards Compatibility Notes	In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data. In the X-Series, “state” always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.
Backwards Compatibility Notes	Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn’t support and it will limit the recalled setting to what it allows. Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can’t be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible. It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user. Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.
Initial S/W Revision	Prior to A.02.00

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or "Recalled State Register <register number>" is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See "More Information" on page 748.

Key Path	Recall
Mode	All
Remote Command	`:MMEMory:LOAD:STATe <filename>`
Example	:MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path
Example	MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state.
Notes	When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled. • If there is a mismatch between file version or model number or instrument version or model number, the recall functiontries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number. After recalling the state, the Recall State function does the following: • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0.

	• Executes a *CLS If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu.
Backwards Compatibility SCPI	`:MMEMory:LOAD:STATe 1,<filename>` For backwards compatibility, the above syntax is supported. The "1" is simply ignored.
Initial S/W Revision	Prior to A.02.00

More Information

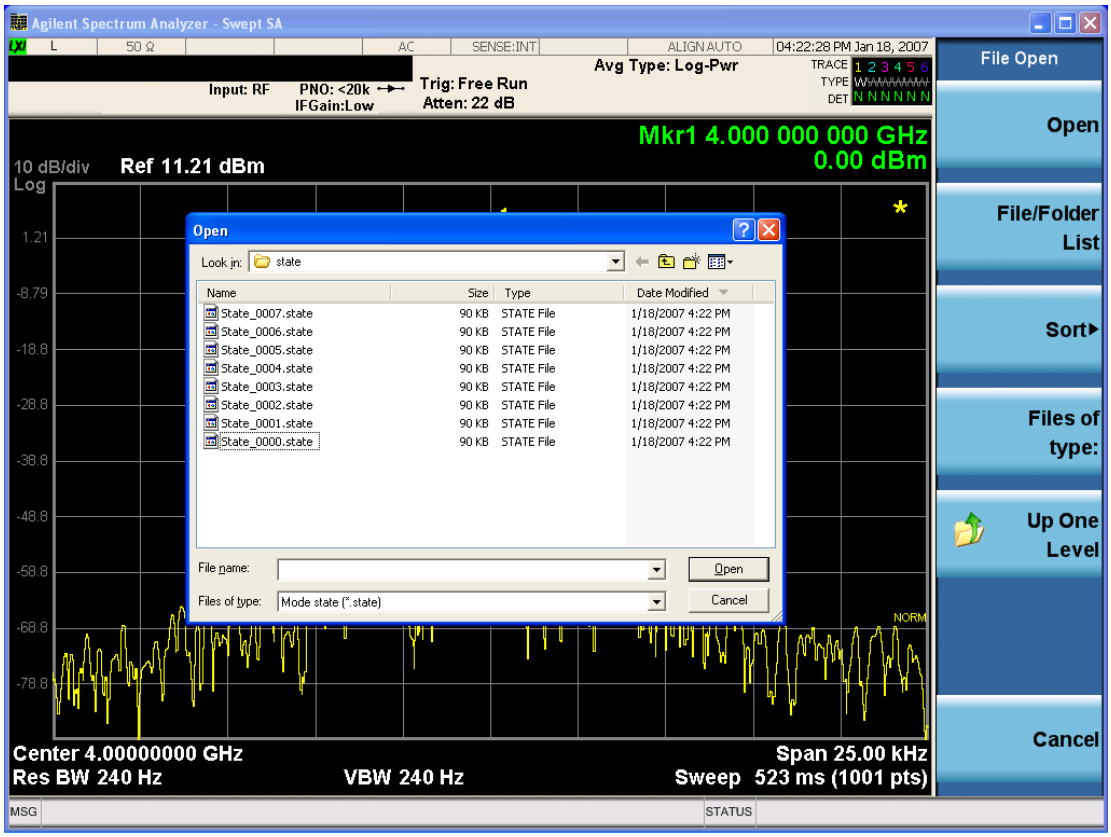
In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible,and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

The following table describes the Trace Save and Recall possibilities:

You want to recall state and one trace's data, leaving other traces unaffected.	Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed.	On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed.
You want to recall all traces	Save Trace+State from ALL traces.	On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved)
You want all traces to load exactly as they were when saved.	Save State	On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating willhave their data immediately overwritten.

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The Look In field first uses the last path from the Save As dialog Save In: path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current Open request to be cancelled. The ESC key does the same thing.

Key Path	Recall, State
Notes	Brings up the Open dialog for recalling a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

Key Path	Recall, State
Mode	All
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221,"Settings conflict;Option not available"
Initial S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

NOTE In products that run multiple instances of the X-Series Application, recalling the same register name on each instance is a way to share setups between the instances.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)" if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

NOTE In products that run multiple instances of the X-Series Application, recalling the same register name on each instance is a way to share setups between the instances.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

Key Path	Recall, State
Example	*RCL 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)" if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	Prior to A.11.00

Sequences

These keys allow you to import a Tab separated or .txt file that will automatically setup all the parameters required for building a Sequence. The parameters will automatically be loaded into the Stated Sequencer.

Once selected, in order to import the selected Sequence Type you must select the Open key in the Source Sequence menu.

Key Path	Recall, Sequences
Mode	All
Remote Command	`:MMEMory:LOAD:SEQuences: | SLISt | ALISt | SAAList | "MySequence.txt"`
Example	:MMEM:LOAD:SEQ:SLIS "MySequence.txt"
Notes	Available file types are: –CSV (Comma delimited) (*.csv) –Text (Tab delimited) (*.txt)
Initial S/W Revision	A.05.00

Source Sequence

The list of parameters, that configure steps, that makes up a sequence for the Source.

The Source sequence is a sequence of flexible configurable steps that can be set anywhere in the instruments frequency range.

Key Path	Recall,Sequences

Example	:MMEM:LOAD:SEQ:SLIS "MySequence.txt"
Dependencies	Only available in XOBT
Initial S/W Revision	A.05.00

Open...

When you press “Open”, the analyzer brings up a Windows dialog and a menu entitled “File Open.” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "From File..." on page 748in Recall, State, for a full description of this dialog and menu.

Key Path	Recall, Data
Notes	The key location is mode-dependent and will vary. Brings up Open dialog for recalling a <mode specific> Save Type
Initial S/W Revision	Prior to A.02.00

Open...

When you press “Open”, the analyzer brings up a Windows dialog and a menu entitled “File Open.” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "From File..." on page 748in Recall, State, for a full description of this dialog and menu.

Key Path	Recall, Data
Notes	The key location is mode-dependent and will vary. Brings up Open dialog for recalling a <mode specific> Save Type
Initial S/W Revision	Prior to A.02.00

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMediate
- Sending the remote command INIT:RESTart

See "More Information" on page 754

Key Path	Front-panel key
Remote Command	`:INITiate[:IMMediate]` `:INITiate:RESTart`
Example	:INIT:IMM :INIT:REST
Notes	:INITiate:RESTart and :INITiate:IMMediate perform exactly the same function.
Couplings	Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement.
Status Bits/OPC dependencies	This is an Overlapped command. The STATus:OPERation register bits 0 through 8 are cleared. The STATus:QUEStionable register bit 9 (INTegrity sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set.
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTart command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTart command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTart command restart every measurement, which includes all traces and numeric results. There is no change to this operation.
Initial S/W Revision	Prior to A.02.00

More Information

The Restart function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when Restart is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that Restart "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With Average/Hold Number (in Meas Setup menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with Average/Hold Number >1 and at least one trace set to Trace Average, Max Hold, or Min Hold (SA Measurement) or Averaging on (most other measurements), multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for Average/Hold Number. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while Average/Hold Number is the active function, or sending the remote command CALC:AVER:TCON UP.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are States, Traces, and Screen Images. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

Key Path	Front-panel key
Mode	All
Notes	No remote command for this key specifically, but the :MMEM:STORe command is available for specific file types. An example is :MMEM:STOR:STATe <filename>.
Initial S/W Revision	Prior to A.02.00

State

The Save State menu lets you choose a register or file for saving the state.

NOTE In products that run multiple instances of the X-Series Application, all instances share the same register and file location where you want to save the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<mode name>\state

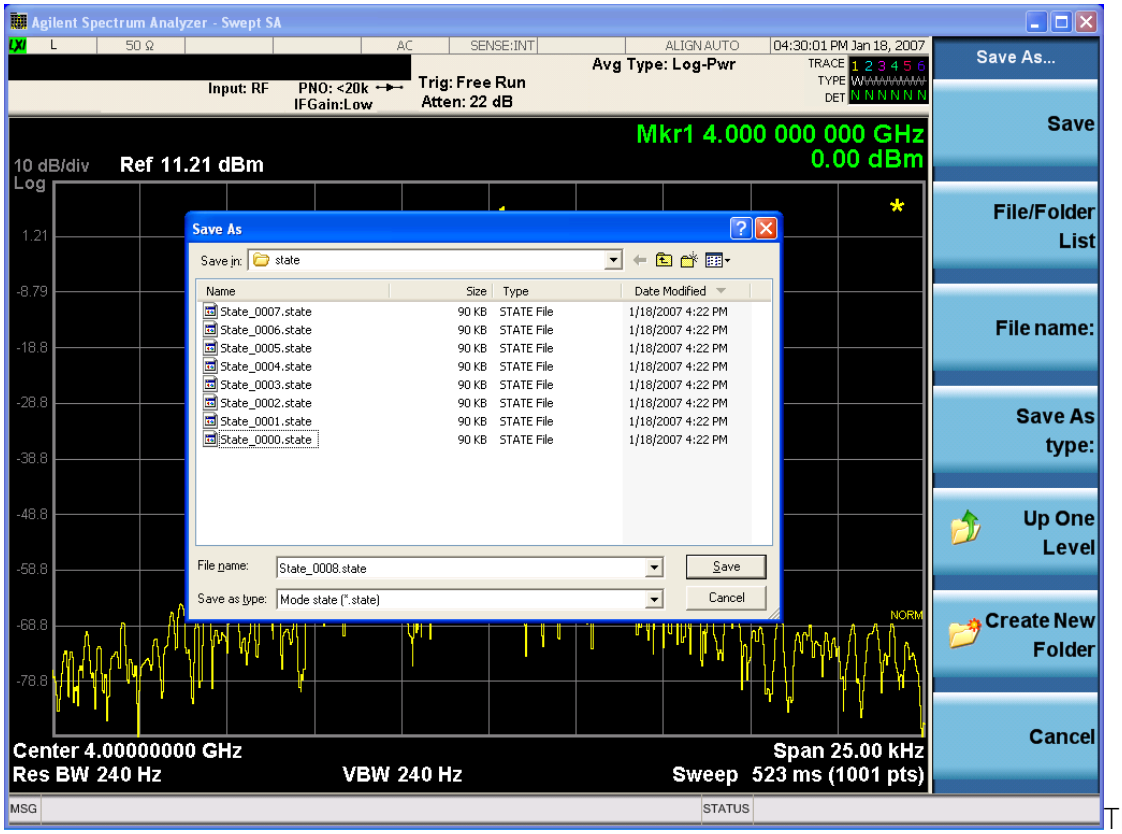
where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save
Mode	All
Remote Command	`:MMEMory:STORe:STATe <filename>`
Example	MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory.
Notes	Both single and double quotes are supported for any filename parameter over remote.

	After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.
Backwards Compatibility SCPI	`:MMEMory:STORe:STATe 1,<filename>` For backwards compatibility, the above syntax is supported. The "1" is simply ignored. The command is sequential.
Initial S/W Revision	Prior to A.02.00

To File . . .

When you press "To File", the analyzer brings up a Windows dialog and a menu entitled "Save As." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK,

the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The Save In field defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the "Quick Save " on page 744 documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor.Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the File Open dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name New Folder and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current Save As request to be cancelled. The ESC key does the same thing.

Key Path	Save, State
Mode	All
Notes	Brings up Save As dialog for saving a State Save Type
Initial S/W Revision	Prior to A.02.00

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See "More Information" on page 759

Key Path	Save, State
Mode	All
Remote Command	`:MMEMory:REGister:STATe:LABel <reg number>,"label"` `:MMEMory:REGister:STATe:LABel? <reg number>`
Example	:MMEM:REG:STAT:LAB 1,"my label"
Notes	<reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, –222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, –150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,""
Dependencies	N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, –221,"Settings conflict;Option not available"
Preset	The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc"
Initial S/W Revision	A.11.00

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name.Another

consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

NOTE **In products that run multiple instances of the X-Series Application, save with different register name if you do not want to overwrite the register of another running instance.**

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)" if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at

what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

NOTE In products that run multiple instances of the X-Series Application, save with different register name if you do not want to overwrite the register of another running instance.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

Key Path	Save, State
Mode	All
Example	*SAV 1
Range	1–16 from front panel, 1–128 from SCPI
Readback	Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)" if no prior save operation has been performed to this register.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.11.00

Mass Storage Catalog (Remote Command Only)

Key path	SCPI Only
Remote Command	`:MMEMory:CATalog? [<directory_name>]`
Notes	The string must be a valid logical path. Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format: <numeric_value>,<numeric_value>,{<file_entry>} It returns two numeric parameters and as many strings as there are files and directories. The first parameter indicates the total amount of storage currently used in bytes. The second parameter indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_ entry> indicates the name, type, and size of one file in the directory list: <file_name>,<file_type>,<file_size> As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty
Initial S/W Revision	Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	`:MMEMory:CDIRectory [<directory_name>]`
	`:MMEMory:CDIRectory?`
Notes	The string must be a valid logical path.
	Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.
	At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.
	Query returns full path of the default directory.
Initial S/W Revision	Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Key path	SCPI Only
Remote Command	`:MMEMory:COPY <string>,<string>[,<string>,<string>]`
Notes	The string must be a valid logical path.
	Copies an existing file to a new file or an existing directory to a new directory.
	Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.
	The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.
	This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

Key path	SCPI Only
Remote Command	`:MMEMory:COPY:DEVice <source_string>,<dest_string>`
Notes	The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device.
	Valid device keywords are:
	SNS (smart noise source)
	An error is generated if the file or device is not found.

Mass Storage Delete (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:DELete <file_name>[,<directory_name>]
Notes	The string must be a valid logical path. Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an "access denied" error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

Key path	SCPI Only
Remote Command	:MMEMory:DATA <file_name>, <data> :MMEMory:DATA? <file_name>
Notes	The string must be a valid logical path. The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data. The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format.
Initial S/W Revision	Prior to A.02.00

Mass Storage Make Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MDIRectory <directory_name>
Notes	The string must be a valid logical path. Creates a new directory. The <directory_name> parameter specifies the name to be created. This command will generate an "access denied" error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Move (Remote Command Only)

Key path	SCPI Only
Remote Command	:MMEMory:MOVE <string>,<string>[,<string>,<string>]
Notes	The string must be a valid logical path. Moves an existing file to a new file or an existing directory to a new directory.

	Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination. The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists. This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Mass Storage Remove Directory (Remote Command Only)

Key path	SCPI Only
Remote Command	`:MMEMory:RDIRectory <directory_name>`
Notes	The string must be a valid logical path. Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed. This command will generate an "access denied" error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.
Initial S/W Revision	Prior to A.02.00

Sequences

These keys allow you to save a Tab separated or CSV file of the setup parameters required to build a Sequence.

In order to save you must select the Save As button and choose a destination folder.

Key Path	Save, Sequences
Mode	All
Remote Command	`:MMEM:STOR:SEQuences: | SLISt | ALISt | SAAList | SSTep "MySequence.txt"`
Example	:MMEM:STOR:SEQ:SLISt "MySequence.txt"
Notes	Available file types are: –CSV (Comma delimited) (*.csv) –Text (Tab delimited) (*.txt)
Initial S/W Revision	A.05.00

Source Sequence

The list of parameters, that configure steps, that makes up a sequence for the Source.

The Source sequence is a sequence of flexible configurable steps that can be set anywhere in the instruments frequency range.

Key Path	Save, Sequences
Example	:MMEM:STOR:SEQ:SLIS "MySequence.txt"
Dependencies	Only available in XOBT
Initial S/W Revision	A.05.00

Save As . . .

This menu lets you select the location where you can save the Sequence. This menu is a standard Windows® dialog with Save As menu keys. The "File Name" field in the Save As dialog is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name softkey. See the Quick Save key documentation for more on the automatic file naming algorithm.

The default path for all Sequence Files is:

My Documents\Sequences

Key Path	Save, Sequences
Mode	All
Notes	Brings up Save As dialog for saving a Sequence Save Type
Initial S/W Revision	A.05.00

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows youto export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

Key Path	Save
Mode	All

Notes	The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands.
Dependencies	If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it.
Preset	Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults
Readback	The data type that is currently selected
Initial S/W Revision	Prior to A.02.00

Save As . . .

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.”** This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "To File . . ." on page 757 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\<mode name>\data\traces

For all of the Limit Data Files:

My Documents\<mode name>\data\limits

For all of the Measurement Results Data Files:

My Documents\<mode name>\data\<measurement name>\results

For all of the Capture Buffer Data Files:

My Documents\<mode name>\data\captureBuffer

Key Path	Save, Data
Mode	All
Notes	The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <mode specific> Save Type. The save is performed immediately and does not wait until the measurement is complete.
Initial S/W Revision	Prior to A.02.00

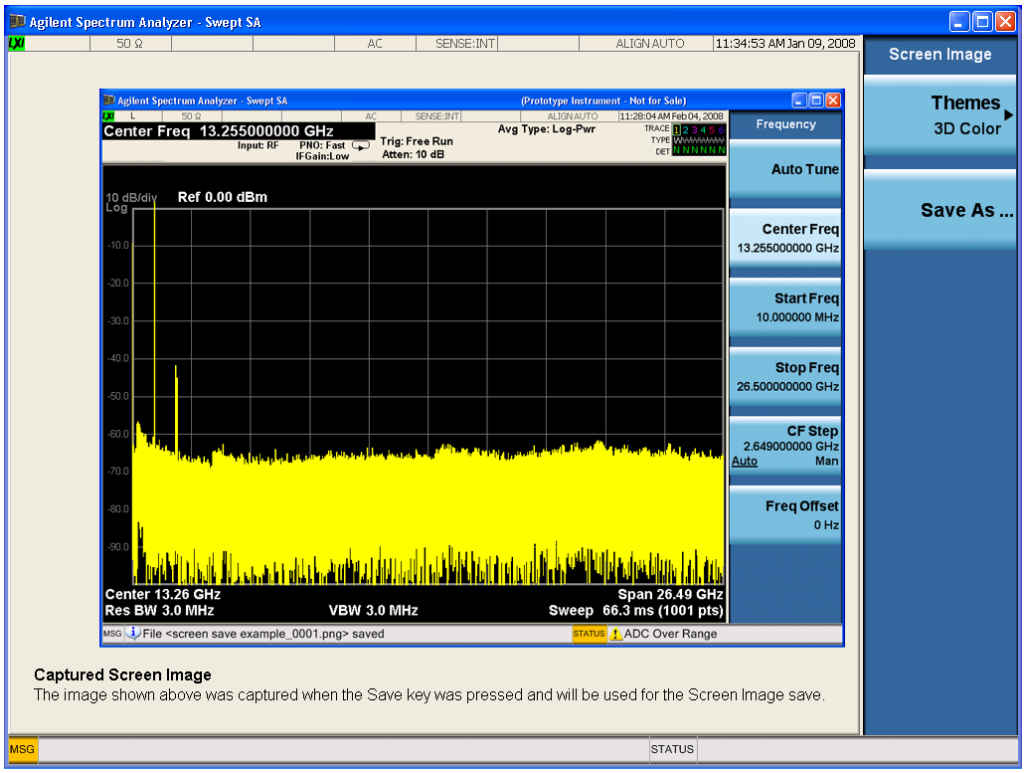
Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen

Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menus. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

Key Path	Save
Mode	All
Remote Command	`:MMEMory:STORe:SCReen <filename>`
Example	:MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The Themes option is the same as the Themes option under the Display and Page Setup dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	`:MMEMory:STORe:SCReen:THEMe TDColor | TDMonochrome | FCOLor | FMONochrome` `:MMEMory:STORe:SCReen:THEMe?`
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color | 3D Mono | Flat Color | Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Save As...

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “Save As.” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "To File . . ." on page 757 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\<mode name>\screen.

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

Key Path	Save, Screen Image
Notes	Brings up Save As dialog for saving a Screen Image Save Type
Initial S/W Revision	Prior to A.02.00

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See "More Information" on page 770

Key Path	Front-panel key
Example	:INIT:CONT OFF
Notes	See Cont key description.
Backwards Compatibility Notes	For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold. For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state. INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORt. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.
Initial S/W Revision	Prior to A.02.00

More Information

See "Restart" on page 754 for details on the INIT:IMMediate (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMediate does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while Average/Hold Number is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

Opens a menu of keys that access various source configuration menus and settings. In the test set, pressing this key also causes the central view area to change and display the Source Control Main view.

Key Path	Front-panel key

RF Output

This parameter sets the source RF power output state.

Key Path	Source
Remote Command	`:OUTPut[:EXTernal][:STATe] ON|OFF|1|0` `:OUTPut[:EXTernal][:STATe]?`
Example	OUTP OFF OUTP?
Notes	The EXTernal node is shown in RD text so the SCPI remains the same between internal and external source control. However, for EXT we do not wish to document this node to the customer since we are controlling the internal source rather than the external source. This setting is for the independent mode and has no effect on the "List Sequencer" on page 850. If the "Sequencer" on page 851 is set to ON, the list sequencer controls the source output and this key will be grayed-out. And this setting will be none-forceful grey out on front panel to indicate out-of-scope. Non-forceful means user still can change this setting by SCPI but cannot change on front panel. When set to OFF will make source leave list sequencer and this setting will be black out and take effect immediately. When the RF Output is ON, an “RF” annunciator is displayed in the system settings panel. When the RF Output is turned Off, the RF annunciator is cleared. If the "Sequencer" on page 851 is set to ON, the “RF” annunciator will be replaced by “SEQ” in the system settings panel, indicating that the output is controlled by the list sequencer.
Preset	Off
Range	On | Off
Initial S/W Revision	A.05.00

Amplitude

Allows you to access the Amplitude sub-menu.

Key Path	Source
Notes	The sub-menu under this button is for independent mode and has no effect on "List Sequencer" on page 850. If the "Sequencer" on page 851 is set to ON, the list sequencer controls the source output and this key will be grayed-out on front panel to indicate out-of-scope. When you set "Sequencer" on page 851 to Off will make source leave list sequencer and this button will be black out.
Initial S/W Revision	A.05.00

RF Power

Allows you to adjust the power level of the source using the numeric keypad, step keys, or RPG. Pressing any digit, 0 through 9, on the numeric keypad brings up the unit terminator.

Please refer to the "RF Power Range " on page 773 table below for the valid ranges.

Key Path	Source, Amplitude
Remote Command	`:SOURce:POWer[:LEVel][:IMMediate][:AMPLitude] <ampl>` `:SOURce:POWer[:LEVel][:IMMediate][:AMPLitude]?`
Example	:SOUR:POW –100 dBm
Notes	Amplitude corrections can be specified for use with the source. In the event of amplitude corrections being applied, the valid ranges for the RF power do not change dependant on the current amplitude correction setting. If the combination of RF power + amplitude correction is higher or lower than the source output range, the Source Unleveled bit is set and the “Source Unleveled” indicator will appear on status panel to indicate that the source cannot maintain the output power that has been requested. When signal generator is unable to maintain the requested output level, the “Source Unleveled” indicator will appear on status panel. When the source output setting is restored to the normal range, the “Source Unleveled” is removed from status panel. Internal source has list sequence mode, which comprises of several steps which contain separate output power, frequency and waveform etc. When the source list sequence playing is complete, the last step keeps playing, and user can use this command to change the list sequence last step’s output power. The multiport adapter RFIO TX ports and GPS ports cannot ensure power accuracy when power setting is lower than –130dBm, this power setting value is defined by the sum of RF Power setting and related amplitude correction value. But user settable value could be lower than this limit. When application detected there exists power setting lower than –130dBm on MPA RFIO TX ports, then popup warning message . When application detected there exists power setting lower than –130dBm on MPA GPS ports, then popup warning message . This is only warning message, and check is performed when RF is ON.
Notes	The Min and Max value here defined UI settable amplitude range. This range is larger than actual amplitude range with level accuracy defined in spec.
Dependencies	The RF power is dependent on the RF output port and frequency, such that the current frequency and selected output port determine the valid range of power values.
Preset	–100 dBm
Min	The range of values depends on the current frequency and selected RF output port. Please refer to the "RF Power Range " on page 773 table below for the valid ranges.
Max	The range of values depends on the current frequency and selected RF output port. Please refer to the "RF Power Range " on page 773 table below for the valid ranges.
Initial S/W Revision	A.05.00

RF Power Range

RF Output Port	Frequency Range	Min Output Power	Max Output Power
High Power RF Out	10 MHz ≤ f ≤ 6 GHz	–150 dBm	20 dBm
RFIO 1 & RFIO 2	10 MHz ≤ f ≤ 6 GHz	–150 dBm	0 dBm
GPS (Note2)	10 MHz ≤ f ≤ 6 GHz	–150 dBm	0 dBm

Note: This is the UI power range, it's larger than actual spec.

Note2: GPS port is on the multiport adapter, or E6607C which has embedded MPA.

Set Reference Power

This key allows you to set the power reference. Pressing this key turns the power reference state to ON, sets the reference power value to the current RF output power, maintains this power at the RF output, and sets the displayed power to 0.00 dB. All subsequent RF power values entered under Source>Amplitude>RF Power are interpreted as being relative to this reference power.

When you use a power reference, the signal generator outputs an RF power that is set relative to the reference power by the value entered under Source>Amplitude>RF Power as follows:

Output power = reference power – entered power

Where:

reference power equals the original RF Power entered under Source>Amplitude>RF Power and set as the reference power

entered power equals a new value entered under Source>Amplitude>Amptd Offset

In addition, the displayed power value is the same as a new value entered under Source>Amplitude>RF Power.

NOTE

If Power Ref is set to ON with a reference value set, entering a value under Source>Amplitude>RF Power and pressing Set Reference Power will add that value to the existing Power Ref value.

If you wish to change the reference power value to a new value entered under Source>Amplitude>RF Power, first you must set Power Ref to OFF and then press Set Reference Power.

Key Path	Source, Amplitude
Dependencies	This key is unavailable, and is grayed out when the "List Sequencer" on page 850 is turned ON.
Initial S/W Revision	A.05.00

Power Ref

This key allows you to toggle the state of the power reference.

When you use a power reference, the signal generator outputs an RF power that is set relative to the reference power by the value entered under Source>Amplitude>RF Power as follows:

Output power = reference power + entered power

Where:

reference power equals the original RF Power entered under Source>Amplitude>RF Power and set as the reference power

entered power equals a new value entered under Source>Amplitude>Amptd Offset

For more information on Reference Frequency refer to "Set Reference Power " on page 773

Key Path	Source, Amplitude

Remote Command	`:SOURce:POWer:REFerence <ampl>`
	`:SOURce:POWer:REFerence?`
	`:SOURce:POWer:REFerence:STATe OFF|ON|0|1`
	`:SOURce:POWer:REFerence:STATe?`

Example	:SOUR:POW:REF 0.00 dBm :SOUR:POW:REF:STATe ON
Dependencies	This setting is unavailable and is grayed out when the "List Sequencer" on page 850 is turned ON.
Couplings	This value is coupled to the "Set Reference Power " on page 773 key such that pressing the Set Reference Power key updates the reference power with the current output power.
Preset	0.00 dBm OFF
Min	–125.00 dBm
Max	10.00 dBm
Initial S/W Revision	A.05.00

Amptd Offset

Allows you to specify the RF output power offset value.

When the amplitude offset is set to zero (0) and you set a new offset value (positive or negative), the displayed amplitude value will change as follows and the RF output power will not change:

Displayed value = output power + offset value

Where:

output power equals the original RF Power entered under Source>Amplitude>RF Power

offset value equals the value entered under Source>Amplitude>Amptd Offset

When the amplitude offset is set to a value other than zero (0) and you enter a new RF power value under Source>Amplitude>RF Power, the displayed power will be the same as the value entered and the RF output power will be equal to the value entered minus the offset value as follows:

Output power = entered power – offset power

Displayed Power = output power + offset power

Displayed power = entered power

Where:

entered power equals the amplitude entered under Source>Amplitude>RF Power

offset power equals the value previously entered and set under Source>Amplitude>Amptd Offset

Key Path	Source, Amplitude
Remote Command	`:SOURce:POWer[:LEVel][:IMMediate]:OFFSet <rel_ampl>` `:SOURce:POWer[:LEVel][:IMMediate]:OFFSet?`
Example	:SOUR:POW:OFFS 0.00 dB
Dependencies	This setting is unavailable, and is grayed out when the List Sequencer is turned ON.
Preset	0.00 dB
Min	–200.00 dB
Max	200.00 dB
Initial S/W Revision	A.05.00

Modulation

Allows you to toggle the state of the modulation.

Key Path	Source
Remote Command	`:OUTPut:MODulation[:STATe] ON|OFF|1|0` `:OUTPut:MODulation[:STATe]?`
Example	:OUTP:MOD OFF
Notes	This setting is for independent mode and has no effect on "List Sequencer" on page 850. If the "Sequencer" on page 851 is set to ON, the list sequencer controls the source output and this key will be grayed-out. And this setting will be none-forceful grey out on front panel to indicate out-of-scope. Non-forceful means user still can change this setting by SCPI but cannot change manually on front panel. When setto Off will make source leave list sequencer and this setting will be black out and take effect immediately When the Modulation is ON, the “MOD” annunciator is displayed in the system settings panel. When the Modulation is turned Off, the “MOD” annunciator is cleared. If the "Sequencer" on page 851 is set to ON, the “MOD” annunciator will be replaced by “SEQ” in the system settings panel indicating that the output is controlled by list sequencer.
Preset	Off
Range	On | Off
Initial S/W Revision	A.05.00

Frequency

Allows you to access the Frequency sub-menu.

Key Path	Source
Notes	The sub-menu under this button is for independent mode and has no effect on "List Sequencer" on

	page 850. If the "Sequencer" on page 851 is set to ON, the list sequencer controls the source output and this key will be grayed-out. And this button will be grey out on front panel to indicate out-of-scope. When setto Off will make source leave list sequencer and this button will be black out.
Initial S/W Revision	A.05.00

Frequency

Allows you to set the RF Output Frequency. You can adjust the frequency of the source using the numeric keypad, step keys, or RPG. Pressing any digit, 0 through 9, on the numeric keypad brings up the unit terminator.

Key Path	Source, Frequency
Remote Command	`:SOURce:FREQuency[:CW] <freq>` `:SOURce:FREQuency[:CW]?`
Example	:SOUR:FREQ 1.00 GHz
Notes	Internal source has list sequence mode, which comprises of several steps which contain separate output power, frequency and waveform etc. When the source list sequence playing is complete, the last step keeps playing, and user can use this command to change the list sequence last step's output frequency.
Couplings	The frequency value is coupled to the current channel band and number, such that updates to the band and number will update the frequency value to the corresponding absolute frequency.
Preset	1.00 GHz If license F1A or 5WC is present, the default Center Frequency should be 2.412GHz.
Min	10.00 MHz
Max	Hardware Dependant: Option 503 = 3.6 GHz Option 504 = 3.8 GHz Option 506 = 6.00 GHz For E6640A, if license 5WC is present,the frequency range should be limited to: 1.1GHz–1.7GHz, 2.4GHz–2.5GHz, 4.8GHz–6.0GHz. If the user-defined frequency is outside of range, UI will report an error message called "Settings conflict; Frequency is outside available range".
Initial S/W Revision	A.05.00

Channel

The frequency of the source can be specified by a channel number of a given frequency band. This key allows you to specify the current channel number. For the appropriate range of channel numbers for a given frequency band, refer to the following tables: "GSM/EDGE Channel Number Ranges" on page 777, "W-CDMA Channel Number Ranges" on page 778, "CDMA 2000 / 1xEVDO Channel Number Ranges" on page 779, and "LTE FDD Channel Number Ranges" on page 781.

Key Path	Source, Frequency
Remote Command	`:SOURce:FREQuency:CHANnels:NUMBer <int>` `:SOURce:FREQuency:CHANnels:NUMBer?`
Example	:SOUR:FREQ:CHAN:NUMB 1
Notes	This key is grayed out when the "Radio Standard" on page 785 is set to NONE. This key is grayed out on E6630A.
Dependencies	This key is grayed out when the "Radio Standard" on page 785 is set to NONE. This key is grayed out on E6630A.
Couplings	The channel number is coupled to the frequency value when the "Radio Standard" on page 785 is not set to NONE. When the frequency value is changed, the channel number will increase or decrease to match the new frequency. If the frequency is not at an exact match for a channel number, the nearest channel number is displayed along with a greater than or less than sign to indicate the frequency is above or below the channel number.
Preset	1
Min	Please refer to the tables below for the valid ranges.
Max	Please refer to the tables below for the valid ranges.
Initial S/W Revision	A.05.00

GSM/EDGE Channel Number Ranges

Band	Link (Device)	Range	Frequency (MHz)
P-GSM	Uplink (MS)	$1 \le n \le 124$	890.0 + 0.2*n
	Downlink (BS)	$1 \le n \le 124$	935.0 + 0.2*n
E-GSM	Uplink (MS)	$0 \le n \le 124$	890.0 + 0.2*n
		$975 \le n \le 1023$	890.0 + 0.2*(n–1024)
	Downlink (BS)	$0 \le n \le 124$	935.0 + 0.2*n
		$975 \le n \le 1023$	935.0 + 0.2*(n–1024)
DCS 1800	Uplink (MS)	$512 \le n \le 885$	1710.200 + 0.20*(n–512)
	Downlink (BS)	$512 \le n \le 885$	1805.200 + 0.20*(n–512)
PCS 1900	Uplink (MS)	$512 \le n \le 810$	1850.200 + 0.2*(n–512)
	Downlink (BS)	$512 \le n \le 810$	1930.200 + 0.2*(n–512)
R-GSM	Uplink (MS)	$0 \le n \le 124$	890.0 + 0.2*n
		$955 \le n \le 1023$	890.0 + 0.2*(n–1024)
	Downlink (BS)	$0 \le n \le 124$	935.0 + 0.2*n
		$955 \le n \le 1023$	935.0 + 0.2*(n–1024)
GSM 450	Uplink (MS)	$256 \le n \le 293$	450.6 + 0.2*(n–259)
	Downlink (BS)	$256 \le n \le 293$	460.6 + 0.2*(n–259)
GSM 480	Uplink (MS)	$306 \le n \le 340$	479.000 + 0.20*(n–306)

Band	Link (Device)	Range	Frequency (MHz)
	Downlink (BS)	306 ≤ n ≤ 340	489.000 + 0.20*(n–306)
GSM 850	Uplink (MS)	128 ≤ n ≤ 251	824.200 + 0.20*(n–128)
	Downlink (BS)	128 ≤ n ≤ 251	869.200 + 0.20*(n–128)
GSM 700	Uplink (MS)	438 ≤ n ≤ 516	777.200 + 0.20*(n–438)
	Downlink (BS)	438 ≤ n ≤ 516	747.200 + 0.20*(n–438)
T-GSM810	Uplink (MS)	350 ≤ n ≤ 425	806.0 + 0.20*(n–350)
	Downlink (BS)	350 ≤ n ≤ 425	851.0 + 0.20*(n–350)

W-CDMA Channel Number Ranges

Band	Link (Device)	Range	Frequency (MHz)
Band I	Downlink	10562 ≤ n ≤ 10838	n÷5
	Uplink	9612 ≤ n ≤ 9888	n÷5
Band II	Downlink	412 ≤ n ≤ 687	n÷5 + 1850.1
		9662 ≤ n ≤ 9938	n÷5
	Uplink	12 ≤ n ≤ 287	n÷5 + 1850.1
		350 ≤ n ≤ 425	n÷5
Band III	Downlink	1162 ≤ n ≤ 1513	n÷5 + 1575
	Uplink	937 ≤ n ≤ 1288	n÷5 + 1525
Band IV	Downlink	537 ≤ n ≤ 1738	n÷5 + 1805
		1887 ≤ n ≤ 2087	n÷5 + 1735.1
	Uplink	1312 ≤ n ≤ 1513	n÷5 + 1450
		1662 ≤ n ≤ 1862	n÷5 + 1380.1
Band V	Downlink	1007 ≤ n ≤ 1087	n÷5 + 670.1
		4357 ≤ n ≤ 4458	n÷5
	Uplink	782 ≤ n ≤ 862	n÷5 + 670.1
		4132 ≤ n ≤ 4233	n÷5
Band VI	Downlink	1037 ≤ n ≤ 1062	n÷5 + 670.1
		4387 ≤ n ≤ 4413	n÷5
	Uplink	812 ≤ n ≤ 837	n÷5 + 670.1
		4162 ≤ n ≤ 4188	n÷5
Band VII	Downlink	2237 ≤ n ≤ 2563	n÷5 + 2175
		2587 ≤ n ≤ 2912	n÷5 + 2105.1
	Uplink	2012 ≤ n ≤ 2338	n÷5 + 2100
		2362 ≤ n ≤ 2687	n÷5 + 2030.1
Band VIII	Downlink	2937 ≤ n ≤ 3088	n÷5 + 340
	Uplink	2712 ≤ n ≤ 2863	n÷5 + 340

Band	Link (Device)	Range	Frequency (MHz)
Band IX	Downlink	9237 ≤ n ≤ 9387	n÷5
	Uplink	8762 ≤ n ≤ 8912	n÷5
Band X	Downlink	3112 ≤ n ≤ 3388	n÷5 + 1490
		3412 ≤ n ≤ 3687	n÷5 + 1430.1
	Uplink	2887 ≤ n ≤ 3163	n÷5 + 1135
		3187 ≤ n ≤ 3462	n÷5 + 1075.1
Band XI	Downlink	3712 ≤ n ≤ 3812	n÷5 + 736
	Uplink	3487 ≤ n ≤ 3587	n÷5 + 733
Band XII	Downlink	3837 ≤ n ≤ 3903	n÷5 – 37
		3927 ≤ n ≤ 3992	n÷5 – 54.9
	Uplink	3612 ≤ n ≤ 3678	n÷5 – 22
		3702 ≤ n ≤ 3767	n÷5 – 39.9
Band XIII	Downlink	4017 ≤ n ≤ 4043	n÷5 – 55
		4067 ≤ n ≤ 4092	n÷5 – 64.9
	Uplink	3792 ≤ n ≤ 3818	n÷5 + 21
		3702 ≤ n ≤ 3767	n÷5 – 39.9
Band XIV	Downlink	4117 ≤ n ≤ 4143	n÷5 – 63
		4167 ≤ n ≤ 4192	n÷5 – 72.9
	Uplink	3892 ≤ n ≤ 3918	n÷5 + 12
		3942 ≤ n ≤ 3967	n÷5 + 2.1
Band XIX	Downlink	712 ≤ n ≤ 763	n÷5 + 735
		787 ≤ n ≤ 837	n÷5 + 720.1
	Uplink	312 ≤ n ≤ 363	n÷5 + 770
		387 ≤ n ≤ 437	n÷5 + 755.1

CDMA 2000 / 1xEVDO Channel Number Ranges

Band	Link (Device)	Range	Frequency (MHz)
US Cellular	Uplink (MS, reverse link)	1 ≤ N ≤ 799	0.030×N+ 825.000
		991 ≤ N ≤ 1023	0.030× (N–1023) + 825.000
		1024 ≤ N ≤ 1323	0.030× (N–1024) + 815.040
	Downlink (BS, forward link)	1 ≤ N ≤ 799	0.030*N+ 870.000
		991 ≤ N ≤ 1023	0.030×(N–1023) + 870.000
		1024 ≤ N ≤ 1323	0.030×(N–1024) + 860.040
US PCS	Uplink (MS, reverse link)	0 ≤ N ≤ 1199	1850.000 + 0.050×N
	Downlink (BS, forward link)	0 ≤ N ≤ 1199	1930.000 + 0.050×N

Band	Link (Device)	Range	Frequency (MHz)
Japan Cellular Band	Uplink (MS, reverse link)	1 ≤ N ≤ 799	0.0125×(N+ 915.000
		801 ≤ N ≤ 1039	0.0125×(N–800)+ 898.000
		1041 ≤ N ≤ 1199	0.0125×(N–1040)+ 887.000
		1201 ≤ N ≤ 1600	0.0125×(N–1200)+ 893.000
	Downlink (BS, forward link)	1 ≤ N ≤ 799	0.0125×(N+ 860.000
		801 ≤ N ≤ 1039	0.0125×(N–800)+ 843.000
		1041 ≤ N ≤ 1199	0.0125×(N–1040)+ 832.000
		1201 ≤ N ≤ 1600	0.0125×(N–1200)+ 838.000
Korean PCS Band	Uplink (MS, reverse link)	0 ≤ N ≤ 599	0.050×N+ 1750.000
	Downlink (BS, forward link)	0 ≤ N ≤ 599	0.050×N+ 1840.000
NMT–450 Band	Uplink (MS, reverse link)	1 ≤ N ≤ 400	0.025×(N–1)+ 450.000
		472 ≤ N ≤ 871	0.025×(N–472)+ 410.000
		1039 ≤ N ≤ 1473	0.020×(N–1024)+ 451.010
		1536 ≤ N ≤ 1715	0.025×(N–1536)+ 479.000
		1792 ≤ N ≤ 2016	0.020×(N–1792)+ 479.000
	Downlink (BS, forward link)	1 ≤ N ≤ 400	0.025×(N–1)+ 460.000
		472 ≤ N ≤ 871	0.025×(N–472)+ 420.000
		1039 ≤ N ≤ 1473	0.020×(N–1024)+ 461.010
		1536 ≤ N ≤ 1715	0.025×(N–1536)+ 489.000
		1792 ≤ N ≤ 2016	0.020×(N–1792)+ 489.000
IMT–2000 Band	Uplink (MS, reverse link)	0 ≤ N ≤ 1199	1920.000 + 0.050×N
	Downlink (BS, forward link)	0 ≤ N ≤ 1199	2100.000 + 0.050×N
Upper 700 MHz Band	Uplink (MS, reverse link)	0 ≤ N ≤ 240	776.000 + 0.050×N
	Downlink (BS, forward link)	0 ≤ N ≤ 240	746.000 + 0.050×N
Secondary 800 MHz Band	Uplink (MS, reverse link)	0 ≤ N ≤ 719	0.025×N+ 806.000
		720 ≤ N ≤ 919	0.025×(N–720) + 896.000
	Downlink (BS, forward link)	0 ≤ N ≤ 719	0.025×N+ 851.000
		720 ≤ N ≤ 919	0.025×(N–720) + 935.000
2.5 GHz IMT Extension	Uplink (MS, reverse link)	0 ≤ N ≤ 1399	2500.000 + 0.050×N
	Downlink (BS, forward link)	0 ≤ N ≤ 1399	2620.000 + 0.050×N
US PCS 1.9 GHz	Uplink (MS, reverse link)	0 ≤ N ≤ 1299	1850.000 + 0.050×N

Band	Link (Device)	Range	Frequency (MHz)
	Downlink (BS, forward link)	0 ≤ N ≤ 1299	1930.000 + 0.050×N
AWS	Uplink (MS, reverse link)	0 ≤ N ≤ 899	1710.000 + 0.050×N
	Downlink (BS, forward link)	0 ≤ N ≤ 899	2100.000 + 0.050×N
US 2.5 GHz	Uplink (MS, reverse link)	140 ≤ N ≤ 1459	2495.000 + 0.050×N
	Downlink (BS, forward link)	140 ≤ N ≤ 1459	2617.000 + 0.050×N
700 Public Safety	Uplink (MS, reverse link)	0 ≤ N ≤ 240	787.000 + 0.050×N
	Downlink (BS, forward link)	0 ≤ N ≤ 240	757.000 + 0.050×N
C2K Lower 700	Uplink (MS, reverse link)	0 ≤ N ≤ 360	698.000 + 0.050×N
	Downlink (BS, forward link)	0 ≤ N ≤ 360	728.000 + 0.050×N
400 Euro PAMR	Uplink (MS, reverse link) Uplink (MS, reverse link) Uplink (MS, reverse link)	1 ≤ N ≤ 400 472 ≤ N ≤ 871 1536 ≤ N ≤ 1715	0.025×(N–1)+ 450.000 0.025×(N–472)+ 410.000 0.025×(N–1536)+ 479.000
	Downlink (BS, forward link) Downlink (BS, forward link) Downlink (BS, forward link)	1 ≤ N ≤ 400 472 ≤ N ≤ 871 1536 ≤ N ≤ 1715	0.025×(N–1)+ 460.000 0.025×(N–472)+ 420.000 0.025×(N–1536)+ 489.000
800 PAMR	Uplink (MS, reverse link)	0 ≤ N ≤ 239	870.0125 + 0.025×N
	Downlink (BS, forward link)	0 ≤ N ≤ 239	915.0125 + 0.025×N

LTE FDD Channel Number Ranges

The carrier frequency in the uplink and downlink is designated by the E-UTRA Absolute Radio Frequency Channel Number (EARFCN) in the range 0 – 65535. The relation between EARFCN and the carrier frequency in MHz for the downlink is given by the following equation, where FDL_low and NOffs-DL are given in table 5.4.4–1 and NDL is the downlink EARFCN.

FDL = FDL_low + 0.1(NDL – NOffs-DL)

The relation between EARFCN and the carrier frequency in MHz for the uplink is given by the following equation where FUL_low and NOffs-UL are given in table 5.4.4–1 and NUL is the uplink EARFCN.

FUL = FUL_low + 0.1(NUL – NOffs-UL)

Band	Downlink	Uplink				
FDL_low (MHz)	NOffs-DL	Range of NDL	FUL_low (MHz)	NOffs-UL	Range of NUL	
1	2110	0	0 – 599	1920	18000	18000 – 18599
2	1930	600	600 – 1199	1850	18600	18600 – 19199
3	1805	1200	1200 – 1949	1710	19200	19200 – 19949
4	2110	1950	1950 – 2399	1710	19950	19950 – 20399
5	869	2400	2400 – 2649	824	20400	20400 – 20649
6	875	2650	2650 – 2749	830	20650	20650 – 20749
7	2620	2750	2750 – 3449	2500	20750	20750 – 20449
8	925	3450	3450 – 3799	880	21450	21450 – 21799
9	1844.9	3800	3800 – 4149	1749.9	21800	21800 – 22149
10	2110	4150	4150 – 4749	1710	22150	22150 – 22749
11	1475.9	4750	4750 – 4949	1427.9	22750	22750 – 22949
12	729	5010	5010 – 5179	699	23010	23010 – 23179
13	746	5180	5180 – 5279	777	23180	23180 – 23279
14	758	5280	5280 – 5379	788	23280	23280 – 23379
…						
17	734	5730	5730 – 5849	704	23730	23730 – 23849
18	860	5850	5850 – 5999	815	23850	23850 – 23999
19	875	6000	6000 – 6149	830	24000	24000 – 24149
20	791	6150	6150 – 6449	832	24150	24150 – 24449
21	1495.9	6450	6450 – 6599	1447.9	24450	24450 – 24599
…						
24	1525	7700	7700 – 8039	1626.5	25700	25700 – 26039
25	1930	8040	8040 – 8689	1850	26040	26040 – 26689
26	859	8690	8690 – 9039	814	26690	26690 – 27039
…						

Note: The channel numbers that designate carrier frequencies so close to the operating band edges that the carrier extends beyond the operating band edge shall not be used. This implies that the first 7, 15, 25, 50, 75 and 100 channel numbers at the lower operating band edge and the last 6, 14, 24, 49, 74 and 99 channel numbers at the upper operating band edge shall not be used for channel bandwidths of 1.4, 3, 5, 10, 15 and 20 MHz respectively.

LTE TDD Channel Number Ranges

The carrier frequency in the uplink and downlink is designated by the E-UTRA Absolute Radio Frequency Channel Number (EARFCN) in the range 0 – 65535. The relation between EARFCN and the carrier frequency in MHz for the downlink is given by the following equation, where FDL_low and NOffs-DL are given in table 5.4.4–1 and NDL is the downlink EARFCN.

FDL = FDL_low + 0.1(NDL – NOffs-DL)

The relation between EARFCN and the carrier frequency in MHz for the uplink is given by the following equation where FUL_low and NOffs-UL are given in table 5.4.4–1 and NUL is the uplink EARFCN.

FUL = FUL_low + 0.1(NUL – NOffs-UL)

Band	Downlink	Uplink				
FDL_low (MHz)	NOffs-DL	Range of NDL	FUL_low (MHz)	NOffs-UL	Range of NUL	
33	1900	36000	36000 –36199	1900	36000	36000 – 36199
34	2010	36200	36200 –36349	2010	36200	36200 – 36349
35	1850	36350	36350 –36949	1850	36350	36350 – 36949
36	1930	36950	36950 –37549	1930	36950	36950 – 37549
37	1910	37550	37550 –37749	1910	37550	37550 – 37749
38	2570	37750	37750 –38249	2570	37750	37750 – 38249
39	1880	38250	38250 –38649	1880	38250	38250 – 38649
40	2300	38650	38650 –39649	2300	38650	38650 – 39649
41	2496	39650	39650 – 41589	2496	39650	39650 – 41589
42	3400	41590	41590 – 43589	3400	41590	41590 – 43589
43	3600	43590	43590 – 45589	3600	43590	43590 – 45589

Note: The channel numbers that designate carrier frequencies so close to the operating band edges that the carrier extends beyond the operating band edge shall not be used. This implies that the first 7, 15, 25, 50, 75 and 100 channel numbers at the lower operating band edge and the last 6, 14, 24, 49, 74 and 99 channel numbers at the upper operating band edge shall not be used for channel bandwidths of 1.4, 3, 5, 10, 15 and 20 MHz respectively.

TDSCDMA Channel Number Ranges

1.28 Mcps TDD Option

No TX-RX frequency separation is required as Time Division Duplex (TDD) is employed. Each subframe consists of 7 main timeslots where all main timeslots (at least the first one) before the single switching point are allocated DL and all main timeslots (at least the last one) after the single switching point are allocated UL.

The nominal channel spacing is 1.6 MHz, but this can be adjusted to optimise performance in a particular deployment scenario.

The carrier frequency is designated by the UTRA absolute radio frequency channel number (UARFCN). The value of the UARFCN in the IMT2000 band is defined in the general case as follows:

Nt = 5*F 0.0 MHz ≤ F≤ 3276.6 MHz

where F is the carrier frequency in MHz

Additional channels applicable to operation in the frequency band defined in sub-clause 5.2(d) are defined via the following UARFCN definition:

Nt = 5 * (F – 2150.1 MHz)2572.5 MHz ≤ F≤ 2617.5 MHz

UARFCN

1.28 Mcps TDD Option

The following UARFCN range shall be supported for each band:

Table: UTRA Absolute Radio Frequency Channel Number 1.28 Mcps TDD Option

Frequency Band	Frequency Range	UARFCN Uplink and Downlink transmission
For operation in frequency band as defined in subclause 5.2 (a)	1900–1920 MHz	9504 to 9596
	2010–2025 MHz	10054 to 10121
For operation in frequency band as defined in subclause 5.2 (b)	1850–1910 MHz	9254 to 9546
	1930–1990 MHz	9654 to 9946
For operation in frequency band as defined in subclause 5.2 (c)	1910–1930 MHz	9554 to 9646
For operation in frequency band as defined in subclause 5.2 (d)	2570–2620 MHz	12854 to 13096
For operation in frequency band as defined in subclause 5.2 (e)	2300–2400 MHz	11504 to 11996
For operation in frequency band as defined in subclause 5.2 (f)	1880–1920 MHz	9404 to 9596

Radio Setup

Allows access to the sub-menus for selecting the radio standard and associated radio band. You can also set a frequency reference and offset.

This menu is greyed out when on E6630A. Radio band settings for GSM, cdma2000, and so on -- most of which are not actually supported in E6630A, which has three narrow frequency bands. So band settings are grayed out.

Key Path	Source, Frequency
Initial S/W Revision	A.05.00

Radio Standard

Allows access to the channel band sub-menus to select the desired radio standard. When you have selected the radio standard, you can then set an active channel band. The radio standard and the active channel band allow you to use channel numbers to set frequency automatically.

Key Path	Source, Frequency, Radio Setup
Remote Command	`:SOURce:FREQuency:CHANnels:BAND NONE | PGSM | EGSM | RGSM | DCS1800 | PCS1900 | TGSM810 | GSM450 | GSM480 | GSM700 | GSM850 | BANDI | BANDII | BANDIII | BANDIV | BANDV | BANDVI | BANDVII | BANDVIII | BANDIX | BANDX | BANDXI | BANDXII | BANDXIII | BANDXIV | BANDXIX | USCELL | USPCS | JAPAN | KOREAN | NMT | IMT2K | UPPER | SECOND | PAMR400 | PAMR800 | IMTEXT | PCS1DOT9G | AWS | US2DOT5G | PUBLIC | LOWER | BAND1 | BAND2 | BAND3 | BAND4 | BAND5 | BAND6 | BAND7 | BAND8 | BAND10 | BAND11 | BAND12 | BAND13 | BAND14 | BAND17 | BAND18 | BAND19 | BAND20 | BAND21 | BAND24 | BAND25 | BAND26 | BAND27 | BAND28 | BAND31 | BAND33 | BAND34 | BAND35 | BAND36 | BAND37 | BAND38 | BAND39 | BAND40 | BAND41 | BAND42 | BAND43 | BAND44 | BANDA | BANDB | BANDC | BANDD | BANDE | BANDF` `:SOURce:FREQuency:CHANnels:BAND?`
Example	:SOUR:FREQ:CHAN:BAND PGSM
Notes	Set this setting to “NONE” will grey out "Channel" on page 776 Channel
Initial S/W Revision	A.05.00

None

Selects no radio standard for use. When you have selected the radio standard to NONE, you cannot use channel numbers to set frequency automatically. You will need to set the frequency manually.

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.05.00

GSM/EDGE

Sets GSM/EDGE as the radio standard for use and accesses the GSM/EDGE specific channel band sub-menus.

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.05.00

P-GSM

Selects P-GSM as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND PGSM
Initial S/W Revision	A.05.00

E-GSM

Selects E-GSM as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND EGSM
Initial S/W Revision	A.05.00

R-GSM

Selects R-GSM as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND RGSM
Initial S/W Revision	A.05.00

DCS 1800

Selects DCS 1800 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND DCS1800
Initial S/W Revision	A.05.00

PCS 1900

Selects PCS 1900 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND PCS1900
Initial S/W Revision	A.05.00

GSM 450

Selects GSM 450 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND GSM450
Initial S/W Revision	A.05.00

GSM 480

Selects GSM 480 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND GSM480
Initial S/W Revision	A.05.00

GSM 850

Selects GSM 850 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND GSM850
Initial S/W Revision	A.05.00

GSM 700

Selects GSM 700 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND GSM700
Initial S/W Revision	A.05.00

T-GSM 810

Selects T-GSM 810 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, GSM/EDGE
Example	:SOUR:FREQ:CHAN:BAND T-GSM810
Initial S/W Revision	A.05.00

WCDMA

Sets WCDMA as the radio standard for use and accesses the W-CDMA specific channel band sub-menus.

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.05.00

Band I

Selects Band I as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDI
Initial S/W Revision	A.05.00

Band II

Selects Band II as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDII
Initial S/W Revision	A.05.00

Band III

Selects Band III as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDIII
Initial S/W Revision	A.05.00

Band IV

Selects Band IV as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDIV
Initial S/W Revision	A.05.00

Band V

Selects Band V as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDV
Initial S/W Revision	A.05.00

Band VI

Selects Band VI as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDVI
Initial S/W Revision	A.05.00

Band VII

Selects Band VII as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDVII
Initial S/W Revision	A.05.00

Band VIII

Selects Band VIII as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDVIII
Initial S/W Revision	A.05.00

Band IX

Selects Band IX as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDIX
Initial S/W Revision	A.05.00

Band X

Selects Band X as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDX
Initial S/W Revision	A.05.00

Band XI

Selects Band XI as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDXI
Initial S/W Revision	A.05.00

Band XII

Selects Band XII as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDXII
Initial S/W Revision	A.05.00

Band XIII

Selects band XIII as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDXIII
Initial S/W Revision	A.05.00

Band XIV

Selects Band XIV as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDXIV
Initial S/W Revision	A.05.00

Band XIX

Selects Band XIX as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, WCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDXIX
Initial S/W Revision	A.14.50

CDMA 2000 / 1xEVDO

Sets CDMA 2000 / 1XEVDO as the radio standard for use and accesses the CDMA 2000/1xEVDO specific channel band sub-menus.

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.05.00

US CELL

Selects US Cell as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND USCELL
Initial S/W Revision	A.05.00

US PCS

Selects US PCS as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND PCS
Initial S/W Revision	A.05.00

Japan Cell

Selects Japan Cell as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND JAPAN
Initial S/W Revision	A.05.00

Korean PCS

Selects Korean PCS as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND KOREAN
Initial S/W Revision	A.05.00

NMT 450

Selects NMT 450 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO

Example	:SOUR:FREQ:CHAN:BAND NMT
Initial S/W Revision	A.05.00

IMT 2000

Selects IMT 2000 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND IMT2K
Initial S/W Revision	A.05.00

Upper 700

Selects Upper 700 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND UPPER
Initial S/W Revision	A.05.00

Secondary 800

Selects Secondary 800 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND SECOND
Initial S/W Revision	A.05.00

400 Euro PAMR

Selects 400 Euro PAMR as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND PAMR400
Initial S/W Revision	A.05.00

800 PAMR

Selects 800 PAMR as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO

Example	:SOUR:FREQ:CHAN:BAND PAMR800
Initial S/W Revision	A.05.00

2.5GHz IMT EXT

Selects 2.5 GHz IMT EXT as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND IMTEXT
Initial S/W Revision	A.05.00

US PCS 1.9GHz

Selects US PCS 1.9 GHz as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND PCS1DOT9G
Initial S/W Revision	A.05.00

AWS

Selects AWS as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND AWS
Initial S/W Revision	A.05.00

US 2.5GHz

Selects US 2.5 GHz as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND US2DOT5G
Initial S/W Revision	A.05.00

700 Public Safety

Selects 700 Public Safety as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO

Example	:SOUR:FREQ:CHAN:BAND PUBLIC
Initial S/W Revision	A.05.00

C2K Lower 700

Selects C2K Lower 700 as the active channel band.

Key Path	Source, Frequency, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Example	:SOUR:FREQ:CHAN:BAND LOWER
Initial S/W Revision	A.05.00

LTE

Sets LTE FDD as the radio standard for use and accesses the LTE FDD specific channel band sub-menus..

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.09.50

BAND 1

Selects BAND 1 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND1
Initial S/W Revision	A.09.50

BAND 2

Selects BAND 2 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND2
Initial S/W Revision	A.09.50

BAND 3

Selects BAND 3 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND3
Initial S/W Revision	A.09.50

BAND 4

Selects BAND 4 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND4
Initial S/W Revision	A.09.50

BAND 5

Selects BAND 5 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND5
Initial S/W Revision	A.09.50

BAND 6

Selects BAND 6 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND6
Initial S/W Revision	A.09.50

BAND 7

Selects BAND 7 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND7
Initial S/W Revision	A.09.50

BAND 8

Selects BAND 8 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND8
Initial S/W Revision	A.09.50

BAND 9

Selects BAND 9 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND9
Initial S/W Revision	A.09.50

BAND 10

Selects BAND 10 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND10
Initial S/W Revision	A.09.50

BAND 11

Selects BAND 11 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND11
Initial S/W Revision	A.09.50

BAND 12

Selects BAND 12 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND12
Initial S/W Revision	A.09.50

BAND 13

Selects BAND 13 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND13
Initial S/W Revision	A.09.50

BAND 14

Selects BAND 14 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND14
Initial S/W Revision	A.09.50

BAND 17

Selects BAND 17 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND17
Initial S/W Revision	A.09.50

BAND 18

Selects BAND 18 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND18
Initial S/W Revision	A.09.50

BAND 19

Selects BAND 19 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND19
Initial S/W Revision	A.09.50

BAND 20

Selects BAND 20 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND20
Initial S/W Revision	A.09.50

BAND 21

Selects BAND 21 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND21
Initial S/W Revision	A.09.50

BAND 24

Selects BAND 24 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND24
Initial S/W Revision	A.09.50

BAND 25

Selects BAND 25 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND25
Initial S/W Revision	A.09.50

BAND 26

Selects BAND 26 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND26
Initial S/W Revision	A.12.53

BAND 27

Selects BAND 27 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND27
Initial S/W Revision	A.14.00

BAND 28

Selects BAND 28 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND28
Initial S/W Revision	A.14.00

BAND 31

Selects BAND 31 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE
Example	:SOUR:FREQ:CHAN:BAND BAND31
Initial S/W Revision	A.14.00

LTE TDD

Sets LTE TDD as the radio standard for use and accesses the LTE TDD specific channel band sub-menus..

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.11.50

BAND 33

Selects BAND 33 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND33
Initial S/W Revision	A.11.50

BAND 34

Selects BAND 34 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND34
Initial S/W Revision	A.11.50

BAND 35

Selects BAND 35 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND35
Initial S/W Revision	A.11.50

BAND 36

Selects BAND 36 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND36
Initial S/W Revision	A.11.50

BAND 37

Selects BAND 37 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND37
Initial S/W Revision	A.11.50

BAND 38

Selects BAND 38 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND38
Initial S/W Revision	A.11.50

BAND 39

Selects BAND 39 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND39
Initial S/W Revision	A.11.50

BAND 40

Selects BAND 40 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND40
Initial S/W Revision	A.11.50

BAND 41

Selects BAND 41 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND41
Initial S/W Revision	A.11.50

BAND 42

Selects BAND 42 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND42
Initial S/W Revision	A.11.50

BAND 43

Selects BAND 43 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND43
Initial S/W Revision	A.11.50

BAND 44

Selects BAND 44 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND44
Initial S/W Revision	A.14.00

TDSCDMA

Sets TDSCDMA as the radio standard for use and accesses the TDSCDMA specific channel band sub-menus..

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.11.50

BAND A

Selects BAND A as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDA
Initial S/W Revision	A.11.50

BAND B

Selects BAND B as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDB
Initial S/W Revision	A.11.50

BAND C

Selects BAND C as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDC
Initial S/W Revision	A.11.50

BAND D

Selects BAND D as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDD
Initial S/W Revision	A.11.50

BAND E

Selects BAND E as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA

Example	:SOUR:FREQ:CHAN:BAND BANDE
Initial S/W Revision	A.11.50

BAND F

Selects BAND F as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDF
Initial S/W Revision	A.11.50

Radio Band Link

Allows you to specify the channel band type as either uplink or downlink link direction. This value is used in conjunction with the channel band and channel number to determine the absolute frequency output by the source. When set to “Uplink”, the source will calculate the uplink frequency using an uplink formula together with the selected channel band and channel number . When set to “Downlink”, the source will calculate the downlink frequency using a downlink formula together with the selected channel band and channel number.

Key Path	Source, Frequency, Radio Setup
Remote Command	`:SOURce:RADio:BAND:LINK DOWN|UP` `:SOURce:RADio:BAND:LINK?`
Example	:SOUR:RAD:BAND:LINK UP
Preset	DOWN
Range	DOWN | UP
Backwards Compatibility SCPI	`:SOURce:RADio:DEVice BTS|MS` `:SOURce:RADio:DEVice?`
Backwards Compatibility Notes	BTS maps to the Downlink frequency MS maps to the Uplink frequency
Initial S/W Revision	A.05.00

Set Reference Frequency

This key allows you to set the frequency reference. Pressing this key turns the frequency reference state to ON, sets the reference frequency value to the current frequency, maintains this frequency at the RF output, and sets the displayed frequency to 0.00 Hz. All subsequent frequencies entered under Source>Frequency>Frequency are interpreted as being relative to this reference frequency.

When you use a frequency reference, the signal generator outputs a frequency that is set relative to the reference frequency by the value entered under Source>Frequency>Frequency as follows:

Output frequency = reference frequency - entered frequency

Where:

reference frequency equals the original RF frequency entered under Source>Frequency>Frequency and set as the reference frequency

entered frequency equals a new value entered under Source>Frequency>Frequency

In addition, the displayed frequency value will be the same as the value entered under Source>Frequency>Frequency.

NOTE

If Freq Reference is set to ON with a reference value set, entering a value under Source>Frequency>Frequency and pressing Set Frequency Reference will add that value to the existing Freq Reference value.

If you wish to change the reference frequency value to the new value entered under Source>Frequency>Frequency, first you must set Freq Reference to OFF and then press Set Frequency Reference.

Key Path	Source, Frequency
Remote Command	`:SOURce:FREQuency:REFerence:SET`
Example	:SOUR:FREQ:REF:SET
Dependencies	This setting is unavailable, and is grayed out when the List Sequencer is turned ON.
Initial S/W Revision	A.05.00

Freq Reference

This key allows you to toggle the state of the frequency reference. When the frequency reference state is ON, an annunciator is displayed on the main source view to indicate this state to the user.

When you use a frequency reference, the signal generator outputs a frequency that is set relative to the reference frequency by the value entered under Source>Frequency>Frequency as follows:

Output frequency = reference frequency + entered frequency

Where:

reference frequency equals the original RF frequency entered under Source>Frequency>Frequency and set as the reference frequency

entered frequency equals a new value entered under Source>Frequency>Frequency

For more information on Reference Frequency refer to "Set Reference Frequency" on page 803

Key Path	Source, Frequency

Remote Command	`:SOURce:FREQuency:REFerence <freq>`
	`:SOURce:FREQuency:REFerence?`
	`:SOURce:FREQuency:REFerence:STATe OFF|ON|0|1`
	`:SOURce:FREQuency:REFerence:STATe?`

Example	:SOUR:FREQ:REF 0.00 Hz

	:SOUR:FREQ:REF:STATe ON
Dependencies	This setting is unavailable, and is grayed out when the List Sequencer is turned ON.
Couplings	The frequency reference state is coupled to the frequency reference set immediate action. When the reference set immediate action key is pressed, or the SCPI command issued, it turns the frequency reference state ON.
Preset	0.00 Hz OFF
Min	0.00 Hz
Max	Hardware Dependant: Option 503 = 3.6 GHz Option 504 = 3.8 GHz Option 506 = 6.00 GHz
Initial S/W Revision	A.05.00

Freq Offset

Allows you to specify the frequency offset value. When the frequency offset state is ON, an annunciator is displayed on the main source view to indicate this state to the user.

When the frequency offset is set to zero (0) and you set a new offset value, the displayed frequency value will change as follows and the RF output frequency will not change:

Displayed value = output frequency + offset value

Where:

output frequency equals the original frequency entered under Source>Frequency>Frequency

offset value equals the value entered under Source>Frequency>Freq Offset

When the frequency offset is set to a value other than zero (0) and you enter a new frequency value under Source>Frequency>Frequency, the displayed frequency will be the same as the value entered and the RF output frequency will be equal to the value entered minus the offset value as follows:

Output frequency = entered frequency – offset frequency

Displayed frequency = output frequency + offset frequency

Displayed frequency = entered frequency

Where:

entered frequency equals the frequency entered under Source>Frequency>Frequency

offset frequency equals the value previously entered and set under Source>Frequency>Freq Offset

Key Path	Source, Frequency
Remote Command	`:SOURce:FREQuency:OFFSet <freq>`

	:SOURce:FREQuency:OFFSet?
Example	:SOUR:FREQ:OFFS 0 Hz
Dependencies	This setting is unavailable, and is grayed out when the List Sequencer is turned ON.
Preset	0 Hz
Min	–100.00 GHz
Max	100.00 GHz
Initial S/W Revision	A.05.00

Modulation Setup

Allows access to the menus for setting up the available modulation types: "ARB" on page 806, "AM" on page 847, "FM" on page 848, and "PM" on page 849.

Key Path	Source
Initial S/W Revision	A.05.00

ARB

Allows you access to the ARB sub-menus.

Key Path	Source, Modulation Setup
Initial S/W Revision	A.05.00

ARB

Allows you to toggle the state of the ARB function. When the ARB is On, a “MOD” annunciator is displayed in the system settings panel. When the ARB is turned Off, the MOD annunciator is cleared

Key Path	Source, Modulation Setup, ARB
Remote Command	:SOURce:RADio:ARB[:STATe] ON|OFF|1|0 :SOURce:RADio:ARB[:STATe]?
Example	:SOUR:RAD:ARB OFF :SOUR:RAD:ARB?
Notes	If the ARB is ON, a user then loads or deletes another file to ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Dependencies	This setting is for independent mode and has no effect on 3.3.8 list sequencer mode. Setting "Sequencer" on page 851 Sequencer to On will put source enter list sequencer mode, and even if ARB state is On, the ARB file will not be played. Setting "Sequencer" on page 851 Sequencer to Off will make source leave list sequencer mode, and this setting will take effect immediately.

	The ARB can only be turned on when there is a waveform file selected for playback. On the GUI If no waveform is selected, this key is grayed out. If you send the SCPI command to turn the ARB on with no waveform selected for playback, the ARB state remains OFF and an error is generated. "- When you try to recall a certain set of states in which the selected waveform is not in ARB memory and the ARB state is On, errors are reported
Preset	Off
Range	On | Off
Initial S/W Revision	A.05.00

Select Waveform

Allows you to access to the waveform selection sub-menus.

Pressing this key changes the central view area to show the Waveform File Selection view.

Key Path	Source, Modulation Setup, ARB
Initial S/W Revision	A.05.00

Select Waveform

Allows you to select a waveform sequence or segment for the dual ARB to play.

NOTE: Selecting a waveform file does not result in automatic adjustments to burst timing (to compensate for the presence or absence of a Multiport Adapter); that adjustment occurs only when a waveform is loaded to ARB memory. See "Load Segment to ARB Memory" for more information about this adjustment.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Remote Command	`:SOURce:RADio:ARB:WAVeform <string>` `:SOURce:RADio:ARB:WAVeform?`
Example	:SOUR:RAD:ARB:WAV "test_waveform.bin"
Notes	If intended waveform is not in the memory yet, then issuing this command by SCPI will invoke ARB loading operation first, which involves a delay of unpredictable length. So this command should be followed by the query *OPC?, which holds off subsequent commands until the loading operating is complete. <string> - specifies the name of the waveform segment or waveform sequence to be played by the ARB. When in Sequence Analyzer mode, and Include Source is Yes, if the you attempt to play a waveform sequence but not all the required waveform segments are in the ARB playback memory, the application will reject the loading operation with an error is generated . When Include Source is No, if you attempt to play a waveform sequence but not all the required waveform segments are contained in the ARB playback memory, the application will attempt to load the required segments from either the default directory of the current directory. If the ARB memory does not have enough space for all the waveform segments to be loaded, an error is generated and

	none of the waveform segments is loaded. If the ARB is ON, and you attampt to play a waveform sequence but not all the waveform segments within the sequence could be found to be loaded into ARB memory, an error is generated. The selected waveform keeps the previous value and ARB state remains On. If you specify a waveform segment over SCPI but the waveform segment is not present within ARB playback memory and cannot be found for auto loading within the current directory or the default directory, an error is generatedand the file selection remains unchanged. If you select a waveform for playback and the waveform requires a license that is not installed on the instrument, an error is generated.error is generated. If the ARB is ON and you load a file to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Segments on Hard Disk

Allows you access to the sub-menus for loading waveform segments from the hard disk into ARB memory. The default directory is: D: varb.

Pressing this key changes the current view to the Waveform Management View.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Initial S/W Revision	A.05.00

Load Segment To ARB Memory

Allows you to load the selected file into ARB memory. On the front panel you select the file for loading to the ARB memory by highlighting the desired file in the list. Using the SCPI command, you specify the file name on the HDD.

“NVWFM” (none-volatile storage) MSUS (Mass Storage Unit Specifier) is supported in the memory subsystem because the ARB memory cannot be accessed directly. Therefore, files must be downloaded to the instrument hard disk and then loaded into the ARB memory. “NVWFM” MSUS will be mapped to the default directory D: VARB. The SCPI command supports using either “NVWFM” MSUS or specifying a full path. For more information, see Memory Subsystem (Remote Command Only).

If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MMEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk

Remote Command	`:SOURce:RADio:ARB:LOAD <string>`
Example	:SOUR:RAD:ARB:LOAD “D: VARB\testwaveform.bin” or :SOUR:RAD:ARB:LOAD “NVWFM:testwaveform.bin”
Notes	Because loading the file involves a delay of unpredictable length, this command should be followed by the query *OPC?, which holds off subsequent commands until the loading operating is complete. <string> – specifies the path name of the file to load from the HDD into ARB memory. It could be a <full path + filename>, or <“NVWFM” MSUS + colon + filename>. When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load a file to ARB memory will be rejected with an error. When Include Source is Noand if there is insufficient free ARB memory to load the selected waveform, an error is generated. . If you specify a file over SCPI, but the file is not at the specified location, an error is generated. If you try to load a waveform file but the file contains less than 500 IQ sampes, an error is generated. If you try to load a Signal Studio waveform “*.wfm” which contains invalid waveform header, an error is generated. If the ARB is ON when you load afile to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished. ARB can be loaded into ARB memory even required licenses do not present on the instrument. In this case, a GUI only warning message –800, “Operation complete; Loaded <filename> successfully, but no license <required licenses> installed”. User can install required licenses according to <required licenses> string to license it, or multi-pack license it.
Initial S/W Revision	A.05.00

Load All To ARB Memory

Allows you to load all the segment files within the currently selected directory into ARB memory. If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:LOAD:ALL <string>`
Example	:SOUR:RAD:ARB:LOAD:ALL “D: varb”
Notes	<string> - specifies the directory on the HDD to load the files into ARB memory from. When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load all files from a directory to ARB memory is rejected with an error. When Include Source is No and there is insufficient free ARB memory to load all the waveforms,

	when the ARB memory is full, the copy ceases, and an error is generated. If you specify a directory over SCPI, but the directory does not exist, an error is generated. If the ARB is ON, a user then loads or deletes file to ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Change Directory...

Allows you to change the currently selected directory on the hard disk. Pressing this key opens a standard windows change directory dialog allowing you to select the new directory of interest.

The current directory is used for manually loading waveform segments into ARB memory for playback, and as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence or a list sequence.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Notes	No remote command, SCPIfront panel only.
Initial S/W Revision	A.05.00

Default Directory...

Allows you to change the default directory. It is used as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence, and as a search location for selecting waveforms using SCPI.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:DEFault:DIRectory <string>` `:SOURce:RADio:ARB: DEFault:DIRectory?`
Example	:SOUR:RAD:ARB:DEF:DIR “D:\ArbFiles” :SOUR:RAD:ARB:DEF:DIR?
State Saved	Persistent, survives a power cycle and a preset but not saved in the instrument state
Initial S/W Revision	A.05.00

Segments in ARB Memory

Allows you access to the sub-menus for managing the files within ARB memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Initial S/W Revision	A.05.00

Delete Segment From ARB Mem

Allows you to remove a segment from ARB playback memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments in ARB Memory
Remote Command	`:SOURce:RADio:ARB:DELete <string>`
Example	:SOUR:RAD:ARB:DEL “testwaveform.bin”
Notes	<string> - specifies the waveform to be deleted from the ARB playback memory. When in Sequence Analyzer mode and Include Source is Yes, an attempt to delete a file from ARB memory is rejected with an error. When Include Source is No and you specify a file that does not exist within ARB memory, an error is generated. It is possible to delete files from within the ARB memory when the ARB is ON. However, if you attempt to delete the file that is currently playing an error is generated. It is possible to delete a file from within the ARB memory when the sequencer state is ON and the file is not being used by the List Sequencer. If you attempt to delete a file which is being used by the list sequencer, an error is generated. When sequencer state is On, even if ARB state is On, the selected waveform will not be played. In this case, if the selected waveform is not used in List Sequence, it can be deleted and the ARB state is turned Off. If the ARB is ON and you load a file to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Delete All From ARB Memory

Allows you to remove all segments from ARB playback memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments in ARB Memory
Remote Command	`:SOURce:RADio:ARB:DELete:ALL`
Example	:SOUR:RAD:ARB:DELete:ALL
Notes	When in Sequence Analyzer mode and Include Source is Yes, an attempt to delete all files from ARB memory is rejected with an error. When Include Source is No and you attempt to delete all files from ARB memory when the ARB is currently playing a file, all files except the one playing are deleted and an error is generated. If you attempt to delete all files from ARB memory when there are waveform files used in "List Sequencer" on page 850 and "Sequencer" on page 851 state is ON, all files except the files currently being used in list sequencer are deleted, and an error is generated. If the ARB is ON and you load a file to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Query ARB Memory File List (Remote Command Only)

Queries the test set for the list of waveform segments in the ARB memory.

NOTE This command returns a string for waveform segment names in ARB memory. If you want a string list of waveform segments in the ARB memory, use "Query ARB Memory Full File List (Remote Command Only)" on page 812.

Remote Command	`:SOURce:RADio:ARB:CATalog?`
Example	:SOUR:RAD:ARB:CATalog?
Notes	The return data is in the following format: <integer> - memory used <integer> - memory free <string> ... - comma separated list of waveform segments within ARB memory
Initial S/W Revision	A.05.00

Query ARB Memory Full File List (Remote Command Only)

Queries the test set for the string list of waveform segments in the ARB memory. It returns a string list for waveform segment names in the ARB memory.

Remote Command	`:SOURce:RADio:ARB:FCATalog?`
Example	:SOUR:RAD:ARB:FCATalog?
Notes	The return data is in the following format: <integer> - memory used <integer> - memory free <integer> - file count in ARB memory <string>,<string>, ... <string> - comma separated string list of waveform segments within ARB memory Example: SOUR:RAD:ARB:FCAT? EXT returns: 27499,2069653,3,”c2k.wfm”,”gsm.wfm”,”wcdma.wfm”
Initial S/W Revision	A.09.00

ARB Setup

Allows access to the ARB setup sub-menus.

Key Path	Source, Modulation Setup, ARB
Initial S/W Revision	A.05.00

Sample Rate

Allows you to set the ARB waveform playback sample rate.

Key Path	Source, Modulation Setup, ARB, ARB Setup
Remote Command	`:SOURce:RADio:ARB:SCLock:RATE <freq>` `:SOURce:RADio:ARB:SCLock:RATE?`
Example	:SOUR:RAD:ARB:SCL:RATE 48.00 MHz
Notes	If there is a sample rate specified in the header of the waveform file, changing that sample rate is not recommended, as it may cause problems with burst timing.
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The sample rate is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the sample rate is updated with the value from the header file. The sample rate will remain unchanged if the newly selected waveform does not have an associated header file.
Preset	125.00 MHz
Min	1.00 kHz
Max	125.00 MHz
Initial S/W Revision	A.05.00

Run-Time Scaling

Allows you to adjust the run-time scaling value. The run-time scaling value is applied in real-time while the waveform is playing.

Key Path	Source, Modulation Setup, ARB, ARB Setup
Remote Command	`:SOURce:RADio:ARB:RSCaling <real>` `:SOURce:RADio:ARB:RSCaling?`
Example	:SOUR:RAD:ARB:RSC 100.00
Notes	This setting cannot be set in E6640A. Grey out on menu and the value is fixed at 70.00%.
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The run-time scaling is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the run-time scaling is updated with the value from the header file. The run-time scaling will remain unchanged if the newly selected waveform does not have an associated header file.
Preset	70.00 %
Min	1.00 %
Max	100.00 %
Initial S/W Revision	A.05.00

Baseband Freq Offset

Allows you to adjust the value by which the baseband frequency is offset relative to the carrier.

Key Path	Source, Modulation Setup, ARB, ARB Setup
Remote Command	`:SOURce:RADio:ARB:BASeband:FREQuency:OFFSet <freq>` `:SOURce:RADio:ARB:BASeband:FREQuency:OFFSet?`
Example	:SOUR:RAD:ARB:BAS:FREQ:OFFS 0.00 Hz
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The baseband frequency offset is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the baseband frequency offset is updated with the value from the header file. The baseband frequency offset will remain unchanged if the newly selected waveform does not have an associated header file.
Preset	0.00 Hz
Min	–50.00 MHz
Max	50.00 MHz
Initial S/W Revision	A.05.00

Trigger Type

Allows access to the trigger type sub-menus. The setting for trigger type determines the behavior of the waveform when it plays.

Key Path	Source, Modulation Setup, ARB
Remote Command	`:SOURce:RADio:ARB:TRIGger:TYPE CONTinuous | SINGle | SADVance GATE` `:SOURce:RADio:ARB:TRIGger:TYPE?`
Example	:SOUR:RAD:ARB:TRIG:TYPE CONT :SOUR:RAD:ARB:TRIG:TYPE?
Notes	Gated trigger type will be implemented at a later release
Preset	CONTinuous
Range	Continuous | Single | Seg Adv | Gated
Initial S/W Revision	A.05.00

Continuous

Sets the active trigger type to Continuous. If Continuous is already selected as the active trigger type, pressing this key allows access to the continuous trigger type setup menu. In Continuous trigger mode, the waveform repeats continuously.

Key Path	Source, Modulation Setup, ARB, Trigger Type
Remote Command	`:SOURce:RADio:ARB:TRIGger:TYPE:CONTinuous[:TYPE] FREE | TRIGger | RESet` `:SOURce:RADio:ARB:TRIGger:TYPE:CONTinuous[:TYPE]?`
Example	:SOUR:RAD:ARB:TRIG:TYPE:CONT FREE
Preset	FREE

Range	Free Run | Trigger + Run | Reset + Run
Initial S/W Revision	A.05.00

Free Run

Selects Free Run as the trigger response for the continuous trigger type. Free Run sets the waveform generator to play a waveform sequence or segment continuously, without waiting for a trigger. In this mode, the waveform generator does not respond to triggers.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Continuous
Example	:SOUR:RAD:ARB:TRIG:TYPE:CONT FREE
Initial S/W Revision	A.05.00

Trigger + Run

Sets Trigger and Run as the trigger response for the continuous trigger type. Trigger and Run sets the waveform generator to play a waveform sequence or segment continuously when the first trigger is received, and to ignore any subsequent triggers.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Continuous
Example	:SOUR:RAD:ARB:TRIG:TYPE:CONT TRIG
Initial S/W Revision	A.05.00

Reset + Run

Sets Reset and Run as the trigger response for the continuous trigger type. Reset and Run sets the waveform generator to play a waveform sequence or segment continuously when the first trigger is received. Subsequent triggers reset the waveform sequence or segment to the start, and then play it continuously.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Continuous
Example	:SOUR:RAD:ARB:TRIG:TYPE:CONT RES
Initial S/W Revision	A.05.00

Single

Sets the active trigger type to Single. If Single is already selected as the active trigger type, pressing this key allows access to the single trigger type setup menu. In Single trigger mode, the waveform plays once.

Key Path	Source, Modulation Setup, ARB, Trigger Type
Remote Command	`:SOURce:RADio:ARB:RETRigger ON|OFF|IMMediate`

	:SOURce:RADio:ARB:RETRigger?
Example	:SOUR:RAD:ARB:RETR OFF
Notes	ON: Buffered Trigger OFF: No Retrigger Immediate: Restart on Trigger This is defined as an enumerated SCPI command, with ON|OFF being considered as enumerated types rather than Boolean. This means the query will return OFF instead of 0, and ON instead of 1.
Preset	ON
Range	No Retrigger | Buffered Trigger | Restart on Trigger
Initial S/W Revision	A.05.00

No Retrigger

Selects No Retrigger as the trigger response for single trigger type. No Retrigger sets the waveform generator to play a waveform sequence or segment once when a trigger is received. Any triggers then received during playback are ignored.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Single
Example	:SOUR:RAD:ARB:RETR OFF
Initial S/W Revision	A.05.00

Buffered Trigger

Selects Buffered Trigger as the trigger response for single trigger type. Buffered Trigger sets the waveform generator to play a waveform sequence or segment once when a trigger is received. If a trigger is received during playback, the waveform generator plays the sequence or segment to the end, then plays the sequence or segment once more.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Single
Example	:SOUR:RAD:ARB:RETR ON
Initial S/W Revision	A.05.00

Restart on Trigger

Selects Restart on Trigger as the trigger response for single trigger type. Restart on Trigger sets the waveform generator to play a waveform sequence or segment once when a trigger is received. If a trigger is received during playback, the waveform generator resets and plays the sequence or segment from the start.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Single
Example	:SOUR:RAD:ARB:RETR IMM
Initial S/W Revision	A.05.00

Segment Advance

Sets the active trigger type to Segment Advance. If Segment Advance is already selected as the active trigger type, pressing this key allows access to the segment advance trigger type setup menu.

Segment Advance triggering allows you to control the playback of waveform segments within a waveform sequence. When a trigger is received the ARB advances to the next waveform segment within the waveform sequence. This type of triggering ignores the repetition count for the waveform segment within the waveform sequence. For example, if a waveform segment has a repetition count of 10 and you select single segment advance triggering mode, the waveform segment will only play once.

Segment Advance triggering can also be used for waveform segments only. In this situation the same waveform segment is played again when a trigger is received.

Key Path	Source, Modulation Setup, ARB, Trigger Type
Remote Command	`:SOURce:RADio:ARB:TRIGger:TYPE:SADVance[:TYPE] SINGle | CONTinuous` `:SOURce:RADio:ARB:TRIGger:TYPE:SADVance[:TYPE]?`
Example	:SOUR:RAD:ARB:TRIG:TYPE:SADV SING
Preset	CONTinuous
Range	Single | Continuous
Initial S/W Revision	A.05.00

Single

Selects Single as the trigger response for Segment Advance trigger type. With single selected, once a trigger is received a segment is played once. If a trigger is received during playback of a segment, the segment plays to completion and the next segment is played once.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Segment Advance
Example	:SOUR:RAD:ARB:TRIG:TYPE:SADV SING
Initial S/W Revision	A.05.00

Continuous

Selects Continuous as the trigger response for Segment Advance trigger type. With continuous selected, once a trigger is received a segment is played continuously. When subsequent triggers are received, the currently playing segment plays to completion and then the next segment is played continuously.

Key Path	Source, Modulation Setup, ARB, Trigger Type, Segment Advance
Example	:SOUR:RAD:ARB:TRIG:TYPE:SADV CONT
Initial S/W Revision	A.05.00

Trigger Source

Allows access to the trigger source sub-menus. The trigger source setting determines how the source receives the trigger that starts the waveform playing. Therefore, this key is grayed out if the trigger type is free run, since free run triggers immediately with no trigger source required.

Key Path	Source, Modulation Setup, ARB
Remote Command	`:SOURce:RADio:ARB:TRIGger[:SOURce] KEY|BUS|EXTernal2` `:SOURce:RADio:ARB:TRIGger[:SOURce]?`
Example	:SOUR:RAD:ARB:TRIGger KEY
Dependencies	This key is grayed out if the current trigger type is Continuous, Free Run.
Preset	EXTernal2
Range	Trigger Key | Bus | External 2
Initial S/W Revision	A.05.00

Trigger Key

Sets the current trigger source to the front panel Trigger key. When Trigger Key is selected, the waveform is triggered when you press the front panel Trigger key.

Key Path	Source, Modulation Setup, ARB, Trigger Source
Example	:SOUR:RAD:ARB:TRIGger KEY
Initial S/W Revision	A.05.00

Bus

Sets the current trigger source to Bus. Selecting Bus trigger source enables triggering over GPIB, LAN, or USB using the :SOURce:RADio:ARB:TRIGger:INITiate command.

Key Path	Source, Modulation Setup, ARB, Trigger Source
Example	:SOUR:RAD:ARB:TRIGger BUS
Initial S/W Revision	A.05.00

External 2

Sets the current trigger source to External 2. Selecting External 2 enables triggering a waveform by an externally applied signal.

Key Path	Source, Modulation Setup, ARB, Trigger Source
Example	:SOUR:RAD:ARB:TRIGger EXT2
Notes	Note: When on E6640A, trigger 2 is a bi-directional trigger port. So when trigger 2 has been configured as OUTPUT type, choosing External 2 as the input trigger for the current step will generate error.
Initial S/W Revision	A.05.00

Trigger Initiate

Used to initiate an immediate trigger event if the trigger source is set to Trigger Key.

Key Path	Source, Modulation Setup, ARB
Notes	No remote command, SCPIfront panel only.
Initial S/W Revision	A.05.00

Waveform Sequences

Allows access to the waveform sequence sub-menus. Pressing this key changes the central view area to display the Waveform Sequence List view.

Key Path	Source, Modulation Setup, ARB
Notes	No remote command, SCPI front panel only.
Initial S/W Revision	A.05.00

Build New Sequence

Allows access to the sub-menus for creating a new waveform sequence. Pressing this key changes the central view area to display the Waveform Sequence Creation and Editing view.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences
Notes	No remote command, SCPIfront panel only.
Initial S/W Revision	A.05.00

Current Segment

Specifies the selected sequence segment that will be affected by the menu functions.

Key Path	Source, Modulation Setup , ARB, Waveform Sequences, Build New Sequence
Notes	No remote command, SCPI front panel only. This key is grayed out and unavailable if the sequence is currently empty.
Initial S/W Revision	A.05.00

Insert New Waveform

Allows you access to the sub-menu for inserting a new waveform segment or sequence. Pressing this key also changes the central display to show the Waveform File Selection View.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence
Notes	No remote command, SCPIfront panel only. Waveform segment name string length upper limit is 128 chars. Please do NOT insert waveform which name string exceeds 128 chars.
Initial S/W Revision	A.05.00

Insert Waveform

Inserts the currently highlighted waveform to the end of the waveform sequence. Pressing this key also returns you to the menus for creating or editing a sequence, and returns the central view to the sequence creation view.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform
Notes	No remote command, SCPIfront panel only. Waveform segment name string length upper limit is 128 chars. Please do NOT insert waveform which name string exceeds 128 chars.
Initial S/W Revision	A.05.00

Segments on Hard Disk

Allows you access to the sub-menus for loading waveform segments from the hard disk into ARB memory. The default directory is: D: varb.

Pressing this key changes the current view to the Waveform Management View.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Initial S/W Revision	A.05.00

Load Segment To ARB Memory

Allows you to load the selected file into ARB memory. On the front panel you select the file for loading to the ARB memory by highlighting the desired file in the list. Using the SCPI command, you specify the file name on the HDD.

“NVWFM” (none-volatile storage) MSUS (Mass Storage Unit Specifier) is supported in the memory subsystem because the ARB memory cannot be accessed directly. Therefore, files must be downloaded to the instrument hard disk and then loaded into the ARB memory. “NVWFM” MSUS will be mapped to the default directory D: VARB. The SCPI command supports using either “NVWFM” MSUS or specifying a full path. For more information, see Memory Subsystem (Remote Command Only).

If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MMEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:LOAD <string>`
Example	:SOUR:RAD:ARB:LOAD “D: VARB\testwaveform.bin” or :SOUR:RAD:ARB:LOAD “NVWFM:testwaveform.bin”
Notes	Because loading the file involves a delay of unpredictable length, this command should be followed by the query *OPC?, which holds off subsequent commands until the loading operating is complete. <string> – specifies the path name of the file to load from the HDD into ARB memory. It could be a <full path + filename>, or <“NVWFM” MSUS + colon + filename>. When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load a file to ARB memory will be rejected with an error. When Include Source is Noand if there is insufficient free ARB memory to load the selected waveform, an error is generated. . If you specify a file over SCPI, but the file is not at the specified location, an error is generated. If you try to load a waveform file but the file contains less than 500 IQ sampes, an error is generated. If you try to load a Signal Studio waveform “*.wfm” which contains invalid waveform header, an error is generated. If the ARB is ON when you load afile to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished. ARB can be loaded into ARB memory even required licenses do not present on the instrument. In this case, a GUI only warning message –800, “Operation complete; Loaded <filename> successfully, but no license <required licenses> installed”. User can install required licenses according to <required licenses> string to license it, or multi-pack license it.
Initial S/W Revision	A.05.00

Load All To ARB Memory

Allows you to load all the segment files within the currently selected directory into ARB memory. If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:LOAD:ALL <string>`

Example	:SOUR:RAD:ARB:LOAD:ALL “D: varb”
Notes	<string> - specifies the directory on the HDD to load the files into ARB memory from. When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load all files from a directory to ARB memory is rejected with an error. When Include Source is No and there is insufficient free ARB memory to load all the waveforms, when the ARB memory is full, the copy ceases, and an error is generated. If you specify a directory over SCPI, but the directory does not exist, an error is generated. If the ARB is ON, a user then loads or deletes file to ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Change Directory...

Allows you to change the currently selected directory on the hard disk. Pressing this key opens a standard windows change directory dialog allowing you to select the new directory of interest.

The current directory is used for manually loading waveform segments into ARB memory for playback, and as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence or a list sequence.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Notes	No remote command, SCPIfront panel only.
Initial S/W Revision	A.05.00

Default Directory...

Allows you to change the default directory. It is used as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence, and as a search location for selecting waveforms using SCPI.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:DEFault:DIRectory <string>` `:SOURce:RADio:ARB: DEFault:DIRectory?`
Example	:SOUR:RAD:ARB:DEF:DIR “D:\ArbFiles” :SOUR:RAD:ARB:DEF:DIR?
State Saved	Persistent, survives a power cycle and a preset but not saved in the instrument state
Initial S/W Revision	A.05.00

Segments in ARB Memory

Allows you access to the sub-menus for managing the files within ARB memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Initial S/W Revision	A.05.00

Delete Segment From ARB Mem

Allows you to remove a segment from ARB playback memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments in ARB Memory
Remote Command	`:SOURce:RADio:ARB:DELete <string>`
Example	:SOUR:RAD:ARB:DEL “testwaveform.bin”
Notes	<string> - specifies the waveform to be deleted from the ARB playback memory. When in Sequence Analyzer mode and Include Source is Yes, an attempt to delete a file from ARB memory is rejected with an error. When Include Source is No and you specify a file that does not exist within ARB memory, an error is generated. It is possible to delete files from within the ARB memory when the ARB is ON. However, if you attempt to delete the file that is currently playing an error is generated. It is possible to delete a file from within the ARB memory when the sequencer state is ON and the file is not being used by the List Sequencer. If you attempt to delete a file which is being used by the list sequencer, an error is generated. When sequencer state is On, even if ARB state is On, the selected waveform will not be played. In this case, if the selected waveform is not used in List Sequence, it can be deleted and the ARB state is turned Off. If the ARB is ON and you load a file to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Delete All From ARB Memory

Allows you to remove all segments from ARB playback memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments in ARB Memory
Remote Command	`:SOURce:RADio:ARB:DELete:ALL`
Example	:SOUR:RAD:ARB:DELete:ALL
Notes	When in Sequence Analyzer mode and Include Source is Yes, an attempt to delete all files from ARB memory is rejected with an error. When Include Source is No and you attempt to delete all files from ARB memory when the ARB is currently playing a file, all files except the one playing are deleted and an error is generated. If you attempt to delete all files from ARB memory when there are waveform files used in "List Sequencer" on page 850 and "Sequencer" on page 851 state is ON, all files except the files currently being used in list sequencer are deleted, and an error is generated.

	If the ARB is ON and you load a file to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Segments on Hard Disk

This key functions the same as "Segments on Hard Disk" on page 877.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform
Initial S/W Revision	Prior to A.09.00

Load Segment To ARB Memory

This key functions the same as "Load Segment To ARB Memory" on page 877.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Load All To ARB Memory

This key functions the same as "Load All To ARB Memory" on page 878.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Change Directory ...

This key functions the same as "Change Directory..." on page 879.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Default Directory ...

This key functions the same as "Default Directory..." on page 879

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Segments in ARB Memory

This key functions the same as "Segments in ARB Memory" on page 879.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform
Initial S/W Revision	Prior to A.09.00

Delete Segment From ARB Memory

This key functions the same as "Delete Segment From ARB Mem" on page 879.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform, Segment in ARB Memory
Initial S/W Revision	Prior to A.09.00

Delete All From ARB Memory

This key functions the same as "Delete All From ARB Memory" on page 880.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Insert New Waveform, Segment in ARB Memory
Initial S/W Revision	Prior to A.09.00

Query ARB Memory File List (Remote Command Only)

This command functions the same as "Query ARB Memory File List (Remote Command Only)" on page 812.

Initial S/W Revision	Prior to A.09.00

Edit Selected Waveform

Allows access to the sub-menus for editing the details of the currently selected waveform segment.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence
Notes	No remote command, front panel only.
Initial S/W Revision	A.05.00

Repetitions

Allows you to specify the number of times the currently selected waveform is played within the sequence.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Edit Selected Waveform
Notes	No remote command, SCPIfront panel only.
Preset	1
Min	1
Max	65535
Initial S/W Revision	A.05.00

Marker 1

Allows you to enable or disable marker 1 for the currently selected waveform. For a waveform sequence, you can enable and disable markers on a per-segment basis, allowing you to output markers from some waveform segments within the sequence, but not for others.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Edit Selected Waveform
Notes	No remote command, front panel only.
Preset	Enabled
Range	Enabled|Disabled
Initial S/W Revision	A.05.00

Marker 2

Allows you to enable or disable marker 2 for the currently selected waveform. For a waveform sequence, you can enable and disable markers on a per-segment basis, allowing you to output markers from some waveform segments within the sequence, but not for others.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Edit Selected Waveform
Notes	No remote command, front panel only.
Preset	Enabled
Range	Enabled|Disabled
Initial S/W Revision	A.05.00

Marker 3

Allows you to enable or disable marker 3 for the currently selected waveform. For a waveform sequence, you can enable and disable markers on a per-segment basis, allowing you to output markers from some waveform segments within the sequence, but not for others.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Edit Selected

	Waveform
Notes	No remote command, front panel only.
Preset	Enabled
Range	Enabled|Disabled
Initial S/W Revision	A.05.00

Marker 4

Allows you to enable or disable marker 4 for the currently selected waveform. For a waveform sequence, you can enable and disable markers on a per-segment basis, allowing you to output markers from some waveform segments within the sequence, but not for others.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence, Edit Selected Waveform
Notes	No remote command, front panel only.
Preset	Enabled
Range	Enabled|Disabled
Initial S/W Revision	A.05.00

Delete Segment

Allows you to delete the selected segment from the waveform sequence.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence
Notes	No remote command, front panel only.
Initial S/W Revision	A.05.00

Save Sequence...

Pressing this key displays the “Save As” dialog. The sequence name is passed to the save as dialog to use as the filename for saving, and the directory the save as dialog will open into is the default waveform directory.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences, Build New Sequence
Initial S/W Revision	A.05.00

Build New Sequence (Remote Command Only)

This command is the SCPI equivalent of the waveform sequence creation features described in "Build New Sequence" on page 819.

This command writes a waveform sequence file to the hard disk. You must specify the waveform sequence file path and filename which will be saved on the hard disk, and the waveform segment file path and name which will be nested into the waveform sequence file. You can utilize mass storage unit specifier (MSUS) “NVWFM” or use a real full path representation. See the example below. MSUS “NVWFM” is mapped to D: VARB directory on test set hard disk.

Any number of segments, up to a segment count limit of 64, can be used to create a sequence. Repeated segments are included in the count limit.

Each waveform segment name string length upper limit is 128 chars. Please do NOT insert waveform which name string exceeds 128 chars.

The internal source does not support nesting one waveform sequence file into another waveform sequence file.

Remote Command	`:SOURce:RADio:ARB:SEQuence[:MWAVeform] <filename>, <waveform1>, <reps>, NONE | M1 | M2 | M3 | M4 | M1M2 | M1M3 | M1M4 | M2M3 | M2M4 | M3M4 | M1M2M3 | M1M2M4 | M1M3M4 | M2M3M4 | M1M2M3M4 | ALL, {<waveform2>, <reps>, NONE | M1 | M2 | M3 | M4 | M1M2 | M1M3 | M1M4 | M2M3 | M2M4 | M3M4 | M1M2M3 | M1M2M4 | M1M3M4 | M2M3M4 | M1M2M3M4 | ALL, } …` (For additional description of each item, see Notes below "For Setup SCPI" on page 828“For Setup SCPI”.) `:SOURce:RADio:ARB:SEQuence[:MWAVeform]? <filename>` (For additional description of each item, see Notes "For Query SCPI" on page 829 below.)
Example	For setup: >:SOUR:RAD:ARB:SEQ “NVWFM:testSeq1.seq”, “NVWFM:wfmSegment1.wfm”, 10, M2M3M4, “NVWFM:wfmSegment2.wfm”, 20, M1M3 Or >:SOUR:RAD:ARB:SEQ “D: VARB\testSeq1.seq”, “ D: VARB\wfmSegment1.wfm”, 10, M2M3M4, “ D: VARB\wfmSegment2.wfm”, 20, M1M3 For query, must specify which waveform sequence file to query. >:SOUR:RAD:ARB:SEQ? “NVWFM:testSeq1.seq” Or >:SOUR:RAD:ARB:SEQ? “D: VARB\testSeq1.seq”,
Notes	## For Setup SCPI For the Setup SCPI command, the parameters are: <filename> - String Type This variable specifies the path and name for the waveform sequence file. The path supports MSUS (NVWFM) or a real full path representation. See example. <waveform1> - String Type This variable specifies the path and name of the first existing waveform segment. The path supports MSUS (NVWFM) or a real full path representation. See example. The segment file must reside within ARB playback memory before it can be played by the ARB player. <reps> - Integer Type

	This variable specifies the number of times a segment or sequence plays before moving on to the next segment or sequence. <marker> - Enum Type NONE – This choice disables all four markers for the waveform. Disabling markers means that the waveform sequence ignores the segments or sequence marker settings. M1, M2, M3, M4 – these choices, either individually or a combination of them, enable the markers for the waveform segment or sequence. Markers not specified are ignored for that segment or sequence. ALL – This choice enables all four markers in the waveform segment or sequence. <waveform2> - String type. This variable specifies the name of a second existing waveform segment. The path supports MSUS (NVWFM) and real full path representation both. See example. The segment file must reside within ARB playback memory before it can be played by the ARB player. <reps> same as above, for the 2nd waveform segment. <marker> same as above, for the 2nd waveform segment. You can insert several waveform segments into a waveform sequence file. Just repeat inserting waveform segments as described above. Error Checks for Setup SCPI command: If you do not specify a filename, or you use an unsupported MSUS (that is, not NVWFM), or have an error in the waveform sequence file path, an error is generated.
Notes	Error Checks for Query SCPI command: (Continued) If the specified waveform sequence file name suffix is not ".seq", error is generated. If you use an unsupported MSUS (that is, not NVWFM), or have an error in the waveform segment file path, an error is generated. If the first specified waveform file cannot be found, an error is generated. If you nest one waveform sequence file into another waveform sequence file, an error is generated. If the specified repetition value is larger than 65535 or smaller than 1, an error is generated. If the specified marker type is unrecognized, an error is generated. For Query SCPI For the Query the parameters are: <filename> - String type. This variable specifies the path and name of the waveform sequence file being queried. The path supports MSUS (NVWFM) or a real full path representation. See example. The return value is a <string>, which includes each waveform segment file name, repetitions, and marker type. For example: >:SOUR:RAD:ARB:SEQ? "NVWFM:testSeq1.seq", <"wfmSegment1. wfm, 10, ALL, wfmSegment2.wfm, 20, M1M3", Error Checks for Query SCPI command: If you do not specify a filename, an error is generated. If the waveform sequence file name is empty, an error is generated. If the specified waveform sequence file cannot be found, an error is generated.
Initial S/W Revision	A.05.00

Edit Selected Sequence

Allows access to the sub-menus for editing the sequence currently selected within the Waveform Sequence List view. Pressing this key changes the central view area to display the Waveform Sequence Creation and Editing view.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences
Notes	No remote command, front panel only.
Initial S/W Revision	A.05.00

Current Directory...

Allows you to change the currently selected directory on the hard disk. Pressing this key opens a standard windows change directory dialog and allows you to select the new directory of interest.

Key Path	Source, Modulation Setup, ARB, Waveform Sequences
Notes	No remote command, front panel only.
Initial S/W Revision	A.05.00

Waveform Utilities

Allows you access to the waveform utilities sub-menus.

Key Path	Source, Modulation Setup, ARB
Initial S/W Revision	A.05.00

Multi-Pack Licenses

Allows you access to the Multi - Pack License sub-menus. Pressing this key also changes the central view area to display the Multi -Pack License Management view.

On modular instrument like E6630A or E6640A, multi-pack license operations are only allowed on the default module, i.e. “Left” module for E6630A or “TRX1” module for E6640A.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities
Notes	If access multi-pack license sub-menu from modules other than “TRX1”, an advisory message like “Please goto “TRX1” to operate multi-pack license” will display.
Dependencies	This key is only available if there is at least one Multi-pack license installed on the instrument.
Initial S/W Revision	A.05.00

Add Waveform

Pressing this key accesses the Add Waveform sub-menu. It also changes the central display area to display the Multi-Pack License Waveform Add view.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses
Dependencies	This key is only available if there is at least one slot available within at least one multi-pack license.
Initial S/W Revision	A.05.00

Add Waveform

Allows you to add the currently selected waveform segment to a multi-pack license. The new waveform is added to the next available slot regardless of which slot was selected on the Multi-Pack License Management view.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Add Waveform

Remote Command	`:SYSTem:LKEY:WAVeform:ADD <string>`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:ADD <string>`

Example	SYST:LKEY:WAV:ADD “mywaveform.wfm” or SYST:LIC:WAV:ADD “mywaveform.wfm”
Notes	The second SCPI :SYSTem:LICense[:FPACk]:WAVeform:ADD is provided to be consistent with the style of Agilent signal sources. You can use either one of them. Since adding a waveform segment to a Multi-Pack license causes the license slot to enter the trial period of only 48 hours, pressing this key causes a confirmation dialog to be displayed to ensure you do want to add the waveform segment to the Multi-Pack. If you attempt to license a waveform that is already licensed using another slot an error is generated. . If current module is not “TRX1” module, the key will grey out, and error message is generated “–221 Setting conflict; Not allowed on current module. Goto “TRX1” to operate multi-pack license” when invoking SCPI.
Dependencies	This key is only available if the currently selected file is a secure waveform requiring a license, and there is at least one slot available within at least one multi-pack license. If the waveform highlighted is a secure waveform, but is already licensed, this key will be unavailable.
Initial S/W Revision	A.05.00

Segments on Hard Disk

Allows you access to the sub-menus for loading waveform segments from the hard disk into ARB memory. The default directory is: D: varb.

Pressing this key changes the current view to the Waveform Management View.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Initial S/W Revision	A.05.00

Load Segment To ARB Memory

Allows you to load the selected file into ARB memory. On the front panel you select the file for loading to the ARB memory by highlighting the desired file in the list. Using the SCPI command, you specify the file name on the HDD.

"NVWFM" (none-volatile storage) MSUS (Mass Storage Unit Specifier) is supported in the memory subsystem because the ARB memory cannot be accessed directly. Therefore, files must be downloaded to the instrument hard disk and then loaded into the ARB memory. "NVWFM" MSUS will be mapped to the default directory D: VARB. The SCPI command supports using either "NVWFM" MSUS or specifying a full path. For more information, see Memory Subsystem (Remote Command Only).

If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MMEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:LOAD <string>`
Example	:SOUR:RAD:ARB:LOAD "D: VARB\testwaveform.bin" or :SOUR:RAD:ARB:LOAD "NVWFM:testwaveform.bin"
Notes	Because loading the file involves a delay of unpredictable length, this command should be followed by the query *OPC?, which holds off subsequent commands until the loading operating is complete. <string> – specifies the path name of the file to load from the HDD into ARB memory. It could be a <full path + filename>, or <"NVWFM" MSUS + colon + filename>. When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load a file to ARB memory will be rejected with an error. When Include Source is Noand if there is insufficient free ARB memory to load the selected waveform, an error is generated. . If you specify a file over SCPI, but the file is not at the specified location, an error is generated. If you try to load a waveform file but the file contains less than 500 IQ sampes, an error is generated. If you try to load a Signal Studio waveform "*.wfm" which contains invalid waveform header, an error is generated. If the ARB is ON when you load afile to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished. ARB can be loaded into ARB memory even required licenses do not present on the instrument. In this

	case, a GUI only warning message –800, “Operation complete; Loaded <filename> successfully, but no license <required licenses> installed”. User can install required licenses according to <required licenses> string to license it, or multi-pack license it.
Initial S/W Revision	A.05.00

Load All To ARB Memory

Allows you to load all the segment files within the currently selected directory into ARB memory. If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:LOAD:ALL <string>`
Example	:SOUR:RAD:ARB:LOAD:ALL “D: varb”
Notes	<string> - specifies the directory on the HDD to load the files into ARB memory from. When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load all files from a directory to ARB memory is rejected with an error. When Include Source is No and there is insufficient free ARB memory to load all the waveforms, when the ARB memory is full, the copy ceases, and an error is generated. If you specify a directory over SCPI, but the directory does not exist, an error is generated. If the ARB is ON, a user then loads or deletes file to ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Change Directory...

Allows you to change the currently selected directory on the hard disk. Pressing this key opens a standard windows change directory dialog allowing you to select the new directory of interest.

The current directory is used for manually loading waveform segments into ARB memory for playback, and as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence or a list sequence.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Notes	No remote command, SCPIfront panel only.
Initial S/W Revision	A.05.00

Default Directory...

Allows you to change the default directory. It is used as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence, and as a search location for selecting waveforms using SCPI.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:DEFault:DIRectory <string>` `:SOURce:RADio:ARB: DEFault:DIRectory?`
Example	:SOUR:RAD:ARB:DEF:DIR “D:\ArbFiles” :SOUR:RAD:ARB:DEF:DIR?
State Saved	Persistent, survives a power cycle and a preset but not saved in the instrument state
Initial S/W Revision	A.05.00

Segments on Hard Disk

This key functions the same as "Segments on Hard Disk" on page 877.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Add Waveform
Initial S/W Revision	Prior to A.09.00

Load Segment To ARB Memory

This key functions the same as "Load Segment To ARB Memory" on page 877.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Add Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Load All To ARB Memory

This key functions the same as "Load All To ARB Memory" on page 878.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Add Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Change Directory ...

This key functions the same as "Change Directory..." on page 879.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Add Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Default Directory ...

This key functions the same as "Default Directory..." on page 879

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Add Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Replace Waveform

Pressing this key accesses the Replace Waveform submenu. It also changes the central display area to display the Multi-Pack License Waveform Add view.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses
Dependencies	This key is only available if the currently selected slot is in the trial state.
Initial S/W Revision	A.05.00

Replace Waveform

Allows you to replace the waveform in the currently selected slot with the waveform currently selected in the Multi-Pack License Waveform Add view.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Replace Waveform

Remote Command	`:SYSTem:LKEY:WAVeform:REPLace <int>, <string>`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:REPLace <int>, <string>`

Example	SYST:LKEY:WAV:REPL 1, “myotherwaveform.wfm” or :SYST:LIC:WAV:REPL 1, “myotherwaveform.wfm”
Notes	The second SCPI :SYSTem:LICense[:FPACk]:WAVeform:REPLace is provided to be consistent with the style of Agilent signal sources. You can use either one of them. If you attempt to license a waveform that is already licensed using another slot an error is generated. Waveform slot number <int> is positive. If you attmpt to input a slot number less than or equals 0, an error is generated. If current module is not “TRX1” module, the key will grey out, and error message is generated “–221 Setting conflict; Not allowed on current module. Goto “TRX1” to operate multi-pack license” when invoking SCPI.
Initial S/W Revision	A.05.00

Segments on Hard Disk

This key functions the same as "Segments on Hard Disk" on page 877.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Replace Waveform
Initial S/W Revision	Prior to A.09.00

Load Segment To ARB Memory

This key functions the same as "Load Segment To ARB Memory" on page 877.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Replace Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Load All To ARB Memory

This key functions the same as "Load All To ARB Memory" on page 878.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Replace Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Change Directory ...

This key functions the same as "Change Directory..." on page 879.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Replace Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Default Directory ...

This key functions the same as "Default Directory..." on page 879

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses, Replace Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Clear Waveform from Slot

Allows you to clear the waveform from the selected slot.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses

Remote Command	`:SYSTem:LKEY:WAVeform:CLEar <int>`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:CLEar <int>`

Example	SYST:LKEY:WAV:CLE 1 or :SYST:LIC:WAV:CLE 1
Notes	The second SCPI :SYSTem:LICense[:FPACk]:WAVeform:CLEar is provided to be consistent with the style of Agilent signal sources. You can use either one of them. Waveform slot number <int> is positive. If you attmpt to input a slot number less than or equals 0, an error is generated. If current module is not "TRX1" module, the key will grey out, and error message is generated "–221 Setting conflict; Not allowed on current module. Goto "TRX1" to operate multi-pack license" when invoking SCPI.
Dependencies	This key is only available if the currently selected slot is in the trial state.
Initial S/W Revision	A.05.00

Lock Waveform in Slot

If the selected slot is in the trial state or the lock required state, the waveform that occupies the slot is locked and permanently licensed.

Key Path	Source, Modulation Setup, ARB, Waveform Utilities, Multi-Pack Licenses

Remote Command	`:SYSTem:LKEY:WAVeform:LOCK <int>`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:LOCK <int>`

Example	SYST:LKEY:WAV:LOCK 1 or SYST:LIC:WAV:LOCK 1
Notes	The second SCPI :SYSTem:LICense[:FPACk]:WAVeform:LOCK is provided to be consistent with the style of Agilent signal sources. You can use either one of them. Waveform slot number <int> is positive. If you attmpt to input a slot number less than or equals 0, an error is generated. If current module is not "TRX1" module, the key will grey out, and error message is generated "–221 Setting conflict; Not allowed on current module. Goto "TRX1" to operate multi-pack license" when invoking SCPI.
Dependencies	This key is only available if the currently selected slot is in the trial state or the lock required state.
Initial S/W Revision	A.05.00

Slot Status Query (Remote Command Only)

Returns the status of the specified slot.

Remote Command	`:SYSTem:LKEY:WAVeform:STATus? <int>`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:STATus? <int>`

Example	:SYST:LKEY:WAV:STAT? 1 <"Locked" or :SYST:LIC:WAV:STAT? 1 <"Locked"
Notes	The second SCPI :SYSTem:LICense[:FPACk]:WAVeform:STATus is provided to be consistent with the style of Agilent signal sources. You can use either one of them. Waveform slot number <int> is positive. If you attmpt to input a slot number less than or equals 0, an error is generated. Result type is string. If input slot number exceeds total available slot number, “Nonexistent” is returned.
Range	"Locked" | "Available" | “Trail” | “LockRequired” | “Nonexistent”
Initial S/W Revision	A.05.00

Slots Free Query (Remote Command Only)

Returns the number of license slots free.

Remote Command	`:SYSTem:LKEY:WAVeform:FREE?`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:FREE?`

Example	:SYST:LKEY:WAV:FREE? or :SYST:LIC:WAV:FREE?
Notes	The second SCPI :SYSTem:LICense[:FPACk]:WAVeform:FREE is provided to be consistent with the style of Agilent signal sources. You can use either one of them.
Initial S/W Revision	A.05.00

Slot Used Query (Remote Command Only)

Returns the number of license slots used.

Remote Command	`:SYSTem:LKEY:WAVeform:USED?`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:USED?`

Example	:SYST:LKEY:WAV:USED?

	or :SYST:LIC:WAV:USED?
Notes	The second SCPI :SYSTem:LICense[:FPACk]:WAVeform:USED is provided to be consistent with the style of Agilent signal sources. You can use either one of them.
Initial S/W Revision	A.05.00

Slot Waveform Name Query (Remote Command Only)

Returns the waveform name of the specified slot

Remote Command	`:SYSTem:LKEY:WAVeform:NAME? <int>`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:NAME? <int>`

Example	:SYST:LKEY:WAV:NAME? 1 <"CDMA2K_22.wfm" or :SYST:LIC:WAV:NAME? 1 <"CDMA2K_22.wfm"
Notes	Waveform slot number <int> is positive. If you attmpt to input a slot number less than or equals 0, an error is generated. Result type is string. If input slot number exceeds total available slot number, “Nonexistent” is returned. If no waveform stored in the specified slot, then empty string is returned.
Initial S/W Revision	A.12.00

Slot Waveform Unique ID Query (Remote Command Only)

Returns the waveform unique ID of the specified slot

Remote Command	`:SYSTem:LKEY:WAVeform:UID? <int>`
	or
	`:SYSTem:LICense[:FPACk]:WAVeform:UID? <int>`

Example	:SYST:LKEY:WAV:UID? 2 <"1346752140" or :SYST:LIC:WAV:UID? 2 <"1346752140"
Notes	Waveform slot number <int> is positive. If you attmpt to input a slot number less than or equals 0, an error is generated. Result type is string. If input slot number exceeds total available slot number, “Nonexistent” is returned.

	If no waveform stored in the specified slot, then “0” is returned
Initial S/W Revision	A.12.00

Locked Waveform Name List Query (Remote Command Only)

Returns the waveform name list of locked.

Remote Command	`:SOURce:RADio:ARB:MPLicensed:NAME:LOCKed?`
Example	SOUR:RAD:ARB:MPL:NAME:LOCKed? <"CDMA2K_27.wfm", "GSM_MCS1.WFM", "c2kWfm.wfm"
Initial S/W Revision	A.11.00

Locked Waveform Unique ID List Query (Remote Command Only)

Returns the waveform unique id list of locked.

Remote Command	`:SOURce:RADio:ARB:MPLicensed:UID:LOCKed?`
Example	SOUR:RAD:ARB:MPL:UID:LOCKed? <"2996927136","3812603511","3710986266"
Notes	Each Signal Studio waveform has a unique id recorded in header. So if the unique ids are same, that means they are same one waveform. So besides SCPI to query locked waveform name list, also provide a SCPI to query locked waveform unique id list
Initial S/W Revision	A.11.00

Marker Utilities

Allows access to the marker utilities sub-menus.

Key Path	Source, Modulation Setup, ARB
Initial S/W Revision	A.05.00

Marker Polarity

Allows access to the marker polarity sub-menu, which allows you to specify the polarity for the four markers. For a positive polarity, the marker signal is high during the marker points. For a negative marker polarity, the marker signal is high during the period of no marker points.

Key Path	Source, Modulation Setup, ARB, Marker Utilities
Initial S/W Revision	A.05.00

Mkr 1 Polarity

Allows you to set the polarity of marker 1.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Polarity
Remote Command	`:SOURce:RADio:ARB:MPOLarity:MARKer1 POSitive|NEGative` `:SOURce:RADio:ARB:MPOLarity:MARKer1?`
Example	:SOUR:RAD:ARB:MPOL:MARK1 NEG
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The marker polarity is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the marker polarity is updated with the value from the header file. The marker polarity will remain unchanged if the newly selected waveform does not have an associated header file.
Preset	Pos
Range	Neg | Pos
Initial S/W Revision	A.05.00

Mkr 2 Polarity

Allows you to set the polarity of marker 2.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Polarity
Remote Command	`:SOURce:RADio:ARB:MPOLarity:MARKer2 POSitive|NEGative` `:SOURce:RADio:ARB:MPOLarity:MARKer2?`
Example	:SOUR:RAD:ARB:MPOL:MARK2 NEG
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The marker polarity is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the marker polarity is updated with the value from the header file. The marker polarity will remain unchanged if the newly selected waveform does not have an associated header file.
Preset	Pos
Range	Neg | Pos
Initial S/W Revision	A.05.00

Mkr 3 Polarity

Allows you to set the polarity of marker 3.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Polarity
Remote Command	`:SOURce:RADio:ARB:MPOLarity:MARKer3 POSitive|NEGative` `:SOURce:RADio:ARB:MPOLarity:MARKer3?`
Example	:SOUR:RAD:ARB:MPOL:MARK3 NEG
Dependencies	When a new waveform is selected for playback the settings contained within the associated

	waveform header file are applied to the ARB. The marker polarity is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the marker polarity is updated with the value from the header file. The marker polarity will remain unchanged if the newly selected waveform does not have an associated header file.
Preset	Pos
Range	Neg | Pos
Initial S/W Revision	A.05.00

Mkr 4 Polarity

Allows you to set the polarity of marker 4.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Polarity
Remote Command	`:SOURce:RADio:ARB:MPOLarity:MARKer4 POSitive|NEGative` `:SOURce:RADio:ARB:MPOLarity:MARKer4?`
Example	:SOUR:RAD:ARB:MPOL:MARK4 NEG
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The marker polarity is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the marker polarity is updated with the value from the header file. The marker polarity will remain unchanged if the newly selected waveform does not have an associated header file.
Preset	Pos
Range	Neg | Pos
Initial S/W Revision	A.05.00

Marker Routing

Allows access to the marker routing sub-menus, which allow you to specify where the marker events are routed. It should be noted that the markers can also be routed to Trigger 1 Out and Trigger 2 Out, however this must be set up using the menus accessed by pressing the “Trigger” hard key.

Key Path	Source, Modulation Setup, ARB, Marker Utilities
Initial S/W Revision	A.05.00

Pulse/RF Blank

Allows you to select which marker is used for the pulse/RF blanking function. The pulse/RF blanking function blanks the RF when the marker signal goes low. The marker polarity determines when the marker signal is high. For a positive polarity, this is during the marker points. For a negative polarity, this is when there are no marker points.

Marker points should be set before using this function. Enabling this function without setting maker points may create a continuous low or high signal, dependant on the marker polarity. This causes either no RF output, or a continuous RF output.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing
Remote Command	`:SOURce:RADio:ARB:MDEStination:PULSe NONE|M1|M2|M3|M4` `:SOURce:RADio:ARB:MDEStination:PULSe?`
Example	:SOUR:RAD:ARB:MDES:PULS NONE
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The pulse/RF blanking setting is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the pulse/RF blanking setting is updated with the value from the header file. The pulse/RF blanking setting will remain unchanged if the newly selected waveform does not have an associated header file.
Range	None | M1 | M2 | M3 | M4
Initial S/W Revision	A.05.00

None

Sets no marker to be used for the pulse/RF blanking function, essentially turning the RF blanking function off.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, Pulse/RF Blank
Example	:SOUR:RAD:ARB:MDES:PULS NONE
Initial S/W Revision	A.05.00

Marker 1

Sets marker 1 to be used for the pulse/RF blanking function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, Pulse/RF Blank
Example	:SOUR:RAD:ARB:MDES:PULS M1
Initial S/W Revision	A.05.00

Marker 2

Sets marker 2 to be used for the pulse/RF blanking function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, Pulse/RF Blank
Example	:SOUR:RAD:ARB:MDES:PULS M2
Initial S/W Revision	A.05.00

Marker 3

Sets marker 3 to be used for the pulse/RF blanking function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, Pulse/RF Blank
Example	:SOUR:RAD:ARB:MDES:PULS M3
Initial S/W Revision	A.05.00

Marker 4

Sets marker 4 to be used for the pulse/RF blanking function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, Pulse/RF Blank
Example	:SOUR:RAD:ARB:MDES:PULS M4
Initial S/W Revision	A.05.00

ALC Hold

Allows you to specify which marker is routed for use within the ALC hold function. The ALC hold marker function holds the ALC circuitry at the average value of the sample points set by the marker.

The ALC hold function operates during the low periods of the marker signal. The marker polarity determines when the marker signal is high. For positive polarity, this is during the marker points. For a negative polarity, this is when there are no maker points.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing
Remote Command	`:SOURce:RADio:ARB:MDEStination:ALCHold NONE|M1|M2|M3|M4` `:SOURce:RADio:ARB:MDEStination:ALCHold?`
Example	:SOUR:RAD:ARB:MDES:ALCH NONE
Dependencies	When a new waveform is selected for playback the settings contained within the associated waveform header file are applied to the ARB. The ALC hold setting is one of the values stored within the header file. If the newly selected waveform file has an associated header file, the ALC hold setting is updated with the value from the header file. The ALC hold setting will remain unchanged if the newly selected waveform does not have an associated header file.
Range	None | M1 | M2 | M3 | M4
Initial S/W Revision	A.05.00

None

Sets no marker to be used for the ALC hold function, essentially turning the ALC hold function off.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, ALC Hold
Example	:SOUR:RAD:ARB:MDES:PULS NONE
Initial S/W Revision	A.05.00

Marker 1

Sets marker 1 to be used for the ALC hold function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, ALC Hold
Example	:SOUR:RAD:ARB:MDES:PULS M1
Initial S/W Revision	A.05.00

Marker 2

Sets marker 2 to be used for the ALC hold function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, ALC Hold
Example	:SOUR:RAD:ARB:MDES:PULS M2
Initial S/W Revision	A.05.00

Marker 3

Sets marker 3 to be used for the ALC hold function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, ALC Hold
Example	:SOUR:RAD:ARB:MDES:PULS M3
Initial S/W Revision	A.05.00

Marker 4

Sets marker 4 to be used for the ALC hold function.

Key Path	Source, Modulation Setup, ARB, Marker Utilities, Marker Routing, ALC Hold
Example	:SOUR:RAD:ARB:MDES:PULS M4
Initial S/W Revision	A.05.00

Header Utilities

Allows access to the header utilities sub-menu. Pressing this key also causes the central display area to change to display the File Header Information view.

Key Path	Source, Modulation Setup, ARB
Dependencies	This key is only available if there is currently a waveform selected for playback. If no waveform is selected, the key is grayed out.
Initial S/W Revision	A.05.00

Clear Header

Allows you to clear the header information from the file header associated with the currently selected waveform.

Key Path	Source, Modulation Setup, ARB, Header Utilities
Remote Command	`:SOURce:RADio:ARB:HEADer:CLEar`
Example	:SOUR:RAD:ARB:HEAD:CLE
Notes	Attempting to clear the header details via SCPI when no waveform was selected for playback will generate an error.
Initial S/W Revision	A.05.00

Save Setup To Header

Allows you to save new file header information details to the file.

Key Path	Source, Modulation Setup, ARB, Header Utilities
Remote Command	`:SOURce:RADio:ARB:HEADer:SAVE`
Example	:SOUR:RAD:ARB:HEAD:SAVE
Notes	Attempting to save the header details via SCPI when no waveform was selected for playback will generate an error.
Initial S/W Revision	A.05.00

Query Waveform Unique ID (Remote Command Only)

Each Signal Studio waveform contains a unique waveform ID, which recorded in the header. This command allows you to query the unique waveform ID from the header. This is a SCPI only command. User can also checkError! Reference source not found. for waveform unique ID display.

Remote Command	`:MMEMory:HEADer:ID? "<file name>"`
Example	:MMEM:HEAD:ID? “test.wfm” (query the waveform already loaded into the ARB memory) :MMEM:HEAD:ID? “D: VARB\test.wfm” (query the waveform on the hard disk by absolute path) :MMEM:HEAD:ID? “NVWFM:test.wfm” (query the waveform on the hard disk by MSUS)
Notes	SCPI query only. The queried waveform file can be in ARB memory, or on hard disk. If want to query ARB in ARB memory, then give out the file name directly. If want to query ARB on the hard disk, then absolute file path or MSUS should be given along with the file name. The valid MSUS is “NVWFM” which is mapped to D: VARB on hard disk. If the file cannot be found in ARB memory or on hard disk, an error is generated.and value –1 is returned
Initial S/W Revision	A.09.00

Bus Trigger Command (Remote Command Only)

Used to initiate an immediate trigger event if the trigger source is set to Bus.

Remote Command	`:SOURce:RADio:ARB:TRIGger:INITiate`
Example	:SOUR:RAD:ARB:TRIG:INIT
Initial S/W Revision	A.05.00

AM

Allows access to the menu for configuring the Amplitude Modulation.

Key Path	Source, Modulation Setup
Initial S/W Revision	A.05.00

AM

Enables or disables the amplitude modulation.

Turning AM on when another modulation format is already on results in the previous modulation format being turned off and the generation of an error.

Key Path	Source, Modulation Setup, AM
Remote Command	`:SOURce:AM:STATe` `:SOURce:AM:STATe?`
Example	:SOUR:AM:STAT OFF
Preset	Off
Range	On | Off
Initial S/W Revision	A.05.00

AM Depth

Allows you to set the amplitude modulation depth in percent.

Key Path	Source, Modulation Setup, AM
Remote Command	`:SOURce:AM[:DEPTh][:LINear]` `:SOURce:AM[:DEPTh][:LINear]?`
Example	:SOUR:AM 0.1
Preset	0.1 %
Min	0.1 %
Max	95.0 %
Initial S/W Revision	A.05.00

AM Rate

Allows you to set the internal amplitude modulation rate.

Key Path	Source, Modulation Setup, AM
Remote Command	`:SOURce:AM:INTernal:FREQuency` `:SOURce:AM:INTernal:FREQuency?`
Example	:SOUR:AM:INT:FREQ 40.0 Hz
Preset	400.0 Hz
Min	10 Hz
Max	40 kHz
Initial S/W Revision	A.05.00

FM

Allows access to the menu for configuring the frequency modulation.

Key Path	Source, Modulation Setup
Initial S/W Revision	A.05.00

FM

Enables or disables the frequency modulation.

Turning FM on when another modulation format is already on results in the previous modulation format being turned off and the generation of an error.

Key Path	Source, Modulation Setup, FM
Remote Command	`:SOURce:FM:STATe` `:SOURce:FM:STATe?`
Example	:SOUR:FM:STAT OFF
Preset	Off
Range	On | Off
Initial S/W Revision	A.05.00

FM Deviation

Allows you to set the frequency modulation deviation.

Key Path	Source, Modulation Setup, FM

Remote Command	:SOURce:FM[:DEViation] :SOURce:FM[:DEViation]?
Example	:SOUR:FM 1.00 kHz
Preset	1.00 Hz
Min	1.00 Hz
Max	100.00 kHz
Initial S/W Revision	A.05.00

FM Rate

Allows you to set the internal frequency modulation rate.

Key Path	Source, Modulation Setup, FM
Remote Command	:SOURce:FM:INTernal:FREQuency :SOURce:FM:INTernal:FREQuency?
Example	:SOUR:FM:INT:FREQ 40.0 Hz
Preset	400.0 Hz
Min	10 Hz
Max	40 kHz
Initial S/W Revision	A.05.00

PM

Allows access to the menu for configuring the phase modulation.

Key Path	Source, Modulation Setup
Initial S/W Revision	A.05.00

PM

Enables or disables the phase modulation.

Turning PM on when another modulation format is already on results in the previous modulation format being turned off and the generation of an error.

Key Path	Source, Modulation Setup, PM
Remote Command	:SOURce:PM:STATe :SOURce:PM:STATe?
Example	:SOUR:PM:STAT OFF

Preset	Off
Range	On | Off
Initial S/W Revision	A.05.00

PM Deviation

Allows you to set the phase modulation deviation.

Key Path	Source, Modulation Setup, PM
Remote Command	`:SOURce:PM[:DEViation]` `:SOURce:PM[:DEViation]?`
Example	:SOUR:PM 1.00 rad
Preset	0.1 rad
Min	0.1 rad
Max	20.0 rad
Initial S/W Revision	A.05.00

PM Rate

Allows you to set the internal phase modulation rate.

Key Path	Source, Modulation Setup, PM
Remote Command	`:SOURce:PM:INTernal:FREQuency` `:SOURce:PM:INTernal:FREQuency?`
Example	:SOUR:PM:INT:FREQ 40.0 Hz
Preset	400.0 Hz
Min	10 Hz
Max	40 kHz
Initial S/W Revision	A.05.00

List Sequencer

Allows you access to the sub-menus for configuring the list sequencer.

List sequences allows you to enter frequencies and amplitudes at unequal intervals in nonlinear ascending, descending or random order. Each step within the list can also include its own waveform file for playback, step duration, trigger event and trigger output.

The complexities involved in configuring the list sequencer do not lend itself to manual configuration; hence the manual configuration for this feature is limited. For easier configuration of the list sequencer, it is recommended that you use either SCPI or load a tab delimited file containing the setup parameters in a

tabular form. The details of the SCPI for configuring the list sequencer can be found in "Step Configuration (Remote Command Only)" on page 884.

Once the List Sequencer has been configured using the front panel, SCPI, or loading in a tab delimited file, the sequence must be initiated using the front panel Initiate Sequence key or the corresponding SCPI command.

Key Path	Source
Initial S/W Revision	A.05.00

Sequencer

Allows you to set the state of the list sequencer. When the list sequencer is on, the source is outputting the sequence defined by the sequencer. When the list sequencer is off, the source outputs a single waveform segment or sequence (independent mode) at a single frequency and amplitude.

Key Path	Source, List Sequencer
Remote Command	`:SOURce:LIST[:STATe] ON|OFF|1|0` `:SOURce:LIST[:STATe]?`
Example	:SOUR:LIST OFF
Notes	When the sequencer is set to ON, the list sequencer controls the output of the source.
Couplings	When in Sequence Analyzer mode and the list sequencer state is Off, Include Source is forced to No, and the Include Source key is grayed out. When in Sequence Analyzer mode and the list sequencer state is On, Include Source is available to set. And, an ARB memory related operation, like load or delete will be rejected.
Preset	Off
Range	On | Off
Initial S/W Revision	A.05.00

Initiate Sequence

Pressing this key arms the sequence for single execution. Once the sequence is armed the source begins the sequence as soon as the trigger is received. If the trigger is set to Free Run, the sequence starts immediately.

Key Path	Source, List Sequencer
Remote Command	`:SOURce:LIST:TRIGger[:IMMediate]`
Example	:SOUR:LIST:TRIG
Notes	When in Sequence Analyzer mode and Include Source is Yes, the Initiate list sequencer operation is rejected, and the key is grayed out, since source list sequence request is sent to physics via Parallel batch by sequence analyzer. If the file needed by the sequencer is not already in ARB memory, the sequence cannot be initiated

	and an error will be generated. There is a blocking SCPI query which can be used to query if source list sequence being initiated successfully or not. (see "Query List Sequence Initiation Armed Status (Remote Command Only)" on page 895 Query Source List Sequence Armed Status)
Dependencies	Under the Sequence Analyzer Mode, if Meas Setup->Include Source is set to YES, Source->List Sequencer->Initiate Sequence is disabled.
Initial S/W Revision	A.05.00

List Sequencer Setup

Allows you access to the list sequencer setup menus.

Key Path	Source, List Sequencer

Number of Steps

Allows you to specify the number of steps within the list sequence.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:NUMBer:STEPs <integer>` `:SOURce:LIST:NUMBer:STEPs?`
Example	:SOUR:LIST:NUMB:STEP 1
Notes	Increasing the number of steps creates additional steps at the end of the list, with all the settings within the steps set to their default values. Decreasing the number of steps removes steps from the end of the list. The settings within the removed steps are not reset. This means that increasing the number of steps again would allow you to retrieve these steps.
Dependencies	The Step Count parameter is increased or decreased when you insert or delete a point from within the GUI interface to the sequencer.
Preset	1
Min	1
Max	1000
Initial S/W Revision	A.05.00

Current Step

Allows you to select the step number you wish to view or edit.

Key Path	Source, List Sequencer, List Sequencer Setup

Notes	No remote command, front panel only.
Preset	1
Min	1
Max	Step Count
Initial S/W Revision	A.05.00

Insert Step Before

Allows you to insert a new step, containing default values, before the currently selected step. Inserting a step will automatically increase the Step Count parameter by 1. If sequence already reaches upper limit of 1000 steps, then insert more step will be rejected and popup error –221, "Setting Conflict; Cannot insert more steps, maximum number of steps reached"

Key Path	Source, List Sequencer, List Sequencer Setup
Notes	No remote command, front panel only. If the list already contains the maximum limit of 1000 steps, no operation will be made after pressing this key.
Initial S/W Revision	A.05.00

Delete Step

Allows you to delete the current step. Deleting a step will automatically decrease the Step Count parameter by 1. If sequence only has one step left, delete step will be rejected and popup error –221, "Setting conflict; Cannot delete current step, minimum number of steps reached"

Key Path	Source, List Sequencer, List Sequencer Setup
Notes	No remote command, Front Panel key only. If the list already contains the minimum limit of 1 step, no operation will be made after pressing this key
Initial S/W Revision	A.05.00

Clear List

Allows you to clear the list. Clearing the list sets the number of steps to the default value of 1 and sets the parameters for the only step to their default values.

Key Path	Source, List Sequencer, List Sequencer Setup
Initial S/W Revision	A.05.00

Step Trigger

Allows access to the sub-menu for selecting the trigger input for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:INPut:TRIGger IMMediate | INTernal | EXTernal2 | KEY | BUS | EXTernal4` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:INPut:TRIGger?`
Example	:SOUR:LIST:STEP2:SET:INP:TRIG BUS :SOUR:LIST:STEP2:SET:INP:TRIG?
Notes	SCPI is supported after A.09.40
Preset	Free Run
Range	Free Run | Internal | Manual (Trigger Key) | Bus | External 2| EXTernal4
Initial S/W Revision	A.05.00

Free Run

Sets the trigger input for the current step to Free Run.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Trigger
Example	:SOUR:LIST:STEP2:SET:INP:TRIG IMM
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Internal

Sets the trigger input for the current step to Internal.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Trigger
Example	:SOUR:LIST:STEP2:SET:INP:TRIG INT
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Manual (Trigger Key)

Sets the trigger input for the current step to Manual (Trigger Key). Any step in the sequence set to Manual will cause the sequence execution to stop until the manual trigger key is pressed. Sending the Bus Trigger SCPI command will have no effect. At any point in the sequence where the list sequencer is paused waiting for a software trigger, a pop up dialog is displayed until the trigger event occurs.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Trigger
Example	:SOUR:LIST:STEP2:SET:INP:TRIG KEY
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Bus

Sets the trigger input for the current step to Bus. Any step in the sequence set to Bus will cause the sequence execution to stop until the Bus Trigger SCPI command is sent. Pressing the manual trigger key has no effect. At any point in the sequence where the list sequencer is paused waiting for a software trigger, a pop up dialog is displayed until the trigger event occurs.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Trigger
Example	:SOUR:LIST:STEP2:SET:INP:TRIG BUS
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

External 2

Sets the trigger input for the current step to External 2.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Trigger
Example	:SOUR:LIST:STEP2:SET:INP:TRIG EXT2
Notes	SCPI is supported after A.09.40
Notes	Note: When on E6640A, trigger 2 is a bi-directional trigger port. So when trigger 2 has been configured as OUTPUT type, choosing External 2 as the input trigger for the current step will generate error.
Initial S/W Revision	A.05.00

Transition Time

Allows you to specify the transition time for the current step.

The transition time is the amount of time allowed for the source to settle at the current frequency or amplitude value.

Transition Time should not be taken as additional time before or inside the Step Duration. You can set a value for the settling time to allow the source output frequency or amplitude to become stable. Make sure that during this period of time, you do not use the source output signal.

The following table lists recommended values for appropriate settling times to allow for changes within the source.

Value Changed	Recommended Transition Time
Frequency	500 µs
Amplitude	100 µs to within 0.1 dB 20 µs to within 1.0 dB

If the Transition Time value is shorter than the time necessary for the hardware to settle and a List Sequence is initiated, a warning is generated.

If the Transition Time value is longer than the Step Duration, an error is generated when initiating a source list sequence. For source list sequence, transition time is included in the step duration length. If the Transition Time value is longer than the Step Duration Time, the real step duration length is extended to equal the transition time and cause a timing shift.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:TRANsition:TIME <time>` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:TRANsition:TIME?`
Example	:SOUR:LIST:STEP2:SET:TRAN:TIME 1ms :SOUR:LIST:STEP2:SET:TRAN:TIME?
Notes	SCPI is supported after A.09.40
Preset	1.0 ms
Min	0.0 ms
Max	4.0 ks
Initial S/W Revision	A.05.00

Radio Setup

Allows you access to the sub-menus for setting up the radio standard, band, and radio band link direction for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup
Notes	No remote command, front panel only.
Initial S/W Revision	A.05.00

Radio Standard

Allows access to the sub-menus for selecting the radio standard and the associated radio band for use in the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:RADio:BAND NONE | PGSM | EGSM | RGSM | DCS1800 | PCS1900 | TGSM810 | GSM450 | GSM480 | GSM700 | GSM850 | BANDI | BANDII | BANDIII | BANDIV | BANDV | BANDVI | BANDVII | BANDVIII | BANDIX | BANDX | BANDXI | BANDXII | BANDXIII | BANDXIV | BANDXIX | USCELL | USPCS | JAPAN | KOREAN | NMT | IMT2K | UPPER | SECOND | PAMR400 | PAMR800 | IMTEXT | PCS1DOT9G | AWS | US2DOT5G | PUBLIC | LOWER | NONE | BAND1 | BAND2 | BAND3 | BAND4 | BAND5 | BAND6 | BAND7 | BAND8 | BAND10 | BAND11 | BAND12 | BAND13 | BAND14 | BAND17 | BAND18 | BAND19 | BAND20 | BAND21 | BAND24 | BAND25 | BAND26 | BAND27 | BAND28 | BAND31 | BAND33 | BAND34 | BAND35 | BAND36 | BAND37 | BAND38 |`

	BAND39 | BAND40 | BAND41 | BAND42 | BAND43 | BAND44 | BANDA | BANDB | BANDC | BANDD | BANDE | BANDF :SOURce:LIST:STEP[1]|2|3…1000:SETup: RADio:BAND?
Example	:SOUR:LIST:STEP2:SET:RAD:BAND PGSM :SOUR:LIST:STEP2:SET:RAD:BAND?
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

None

Selects no radio standard for use on the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard
Example	:SOUR:LIST:STEP2:SET:RAD:BAND NONE
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

GSM/EDGE

Pressing this key once selects GSM/EDGE as the radio standard and the current GSM/EDGE band as the active channel band. Pressing this key again allows access to the sub-menus for selecting a different GSM/EDGE band.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard
Initial S/W Revision	A.05.00

P-GSM

Selects P-GSM as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

E-GSM

Selects E-GSM as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

R-GSM

Selects R-GSM as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

DCS 1800

Selects DCS 1800 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

PCS 1900

Selects PCS 1900 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

GSM 450

Selects GSM 450 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

GSM 480

Selects GSM 480 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

GSM 850

Selects GSM 850 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

GSM 700

Selects GSM 700 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

T-GSM 810

Selects T-GSM 810 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, GSM/EDGE
Initial S/W Revision	A.05.00

WCDMA

Pressing this key once selects WCDMA as the radio standard and the current WCDMA band as the active channel band. Pressing this key again allows access to the sub-menus for selecting a different WCDMA band.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard
Initial S/W Revision	A.05.00

Band I

Selects Band I as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band II

Selects Band II as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band III

Selects Band III as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band IV

Selects Band IV as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band V

Selects Band V as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band VI

Selects Band VI as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band VII

Selects Band VII as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band VIII

Selects Band VIII as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band IX

Selects Band IX as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band X

Selects Band X as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band XI

Selects Band XI as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band XII

Selects Band XII as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band XIII

Selects Band XIII as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band XIV

Selects Band XIV as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.05.00

Band XIX

Selects Band XIX as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, WCDMA
Initial S/W Revision	A.14.50

CDMA 2000 / 1xEVDO

Pressing this key once selects CDMA 2000/1xEVDO as the radio standard and the current CDMA 2000/1xEVDO band as the active channel band. Pressing this key again allows access to the sub-menus for selecting a different CDMA 2000/1xEVDO band.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard
Initial S/W Revision	A.05.00

US CELL

Selects US Cell as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

US PCS

Selects US PCS as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

Japan Cell

Selects Japan Cell as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

Korean PCS

Selects Korean PCS as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

NMT 450

Selects NMT 450 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

IMT 2000

Selects IMT 2000 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

Upper 700

Selects Upper 700 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

Secondary 800

Selects Secondary 800 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

400 Euro PAMR

Selects 400 Euro PAMR as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

800 PAMR

Selects 800 PAMR as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

2.5GHz IMT EXT

Selects 2.5 GHz IMT EXT as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

US PCS 1.9GHz

Selects US PCS 1.9 GHz as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

AWS

Selects AWS as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

US 2.5GHz

Selects US 2.5 GHz as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

700 Public Safety

Selects 700 Public Safety as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

C2K Lower 700

Selects C2K Lower 700 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, CDMA 2000 / 1xEVDO
Initial S/W Revision	A.05.00

LTE

Pressing this key once selects LTE FDD as the radio standard and the current LTE FDD band as the active channel band. Pressing this key again allows access to the sub-menus for selecting a different LTE FDD band.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard
Initial S/W Revision	A.09.50

BAND 1

Selects BAND 1 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 2

Selects BAND 2 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 3

Selects BAND 3 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 4

Selects BAND 4 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 5

Selects BAND 5 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 6

Selects BAND 6 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 7

Selects BAND 7 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 8

Selects BAND 8 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 9

Selects BAND 9 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 10

Selects BAND 10 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 11

Selects BAND 11 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 12

Selects BAND 12 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 13

Selects BAND 13 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 14

Selects BAND 14 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 17

Selects BAND 17 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 18

Selects BAND 18 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 19

Selects BAND 19 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 20

Selects BAND 20 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 21

Selects BAND 21 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 24

Selects BAND 24 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 25

Selects BAND 25 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.09.50

BAND 26

Selects BAND 26 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.12.53

BAND 27

Selects BAND 27 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.14.00

BAND 28

Selects BAND 28 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.14.00

BAND 31

Selects BAND 31 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE
Initial S/W Revision	A.14.00

LTE TDD

Sets LTE TDD as the radio standard for use and accesses the LTE TDD specific channel band sub-menus..

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.11.50

BAND 33

Selects BAND 33 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND33
Initial S/W Revision	A.11.50

BAND 34

Selects BAND 34 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND34
Initial S/W Revision	A.11.50

BAND 35

Selects BAND 35 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND35
Initial S/W Revision	A.11.50

BAND 36

Selects BAND 36 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND36
Initial S/W Revision	A.11.50

BAND 37

Selects BAND 37 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND37
Initial S/W Revision	A.11.50

BAND 38

Selects BAND 38 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND38
Initial S/W Revision	A.11.50

BAND 39

Selects BAND 39 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND39
Initial S/W Revision	A.11.50

BAND 40

Selects BAND 40 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND40
Initial S/W Revision	A.11.50

BAND 41

Selects BAND 41 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND41
Initial S/W Revision	A.11.50

BAND 42

Selects BAND 42 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND42
Initial S/W Revision	A.11.50

BAND 43

Selects BAND 43 as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, LTE TDD
Example	:SOUR:FREQ:CHAN:BAND BAND43
Initial S/W Revision	A.11.50

BAND 44

Selects BAND 44 as the band for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup, Radio Standard, LTE TDD
Initial S/W Revision	A.14.00

TDSCDMA

Sets TDSCDMA as the radio standard for use and accesses the TDSCDMA specific channel band sub-menus..

Key Path	Source, Frequency, Radio Setup, Radio Standard
Initial S/W Revision	A.11.50

BAND A

Selects BAND A as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDA
Initial S/W Revision	A.11.50

BAND B

Selects BAND B as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDB
Initial S/W Revision	A.11.50

BAND C

Selects BAND C as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDC
Initial S/W Revision	A.11.50

BAND D

Selects BAND D as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDD
Initial S/W Revision	A.11.50

BAND E

Selects BAND E as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA

Example	:SOUR:FREQ:CHAN:BAND BANDE
Initial S/W Revision	A.11.50

BAND F

Selects BAND F as the band for the current step.

Key Path	Source, Frequency, Radio Setup, Radio Standard, TDSCDMA
Example	:SOUR:FREQ:CHAN:BAND BANDF
Initial S/W Revision	A.11.50

Radio Band Link

Allows you to specify the radio band link direction for the steps within the list sequence. The link is used in conjunction with the channel band and channel number to determine the output frequency.

When set to “Uplink”, the source will calculate the uplink frequency according to an uplink formula together with selected channel band and channel number. When set to “Downlink”, the source will calculate the downlink frequency according to a downlink formula together with selected channel band and channel number.

Key Path	Source, List Sequencer, List Sequencer Setup, Radio Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:RADio:BAND:LINK DOWN|UP` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:RADio:BAND:LINK?`
Example	:SOUR:LIST:STEP2:SET:RAD:BAND:LINK UP :SOUR:LIST:STEP2:SET:RAD:BAND:LINK?
Notes	SCPI is supported after A.09.40
Preset	DOWN
Range	DOWN | UP
Initial S/W Revision	A.05.00

Channel

Allows you to specify the frequency of the current step via a channel number.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:CNFRequency <double>` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:CNFRequency?`
Example	:SOUR:LIST:STEP2:SET:CNFR 124 :SOUR:LIST:STEP2:SET:CNFR?
Notes	SCPI is supported after A.09.40.

	This SCPI is used to setup channel number or frequency setting, according to current Radio Band setting. If Radio Band is “NONE”, then it’s frequency. If Radio Band is not “NONE”, then it’s channel number.
Couplings	The channel number is coupled to the step frequency value. When the step frequency value is changed, the channel number will increase or decrease to match the new step frequency. If the step frequency is not at an exact match for a channel number, the nearest channel number is displayed, along with a greater than, or less than sign to indicate the frequency is above or below the channel number.
Preset	1
Min	0 (Please refer to for valid ranges.)
Max	10838 (Please refer to for valid ranges.)
Initial S/W Revision	A.05.00

Frequency

Allows you to specify a frequency value for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:CNFRequency <double>` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:CNFRequency?`
Example	:SOUR:LIST:STEP2:SET:CNFR 1GHz :SOUR:LIST:STEP2:SET:CNFR?
Notes	SCPI is supported after A.09.40. This SCPI is used to setup channel number or frequency setting, according to current Radio Band setting. If Radio Band is “NONE”, then it’s frequency. If Radio Band is not “NONE”, then it’s channel number.
Couplings	The frequency value is coupled to the channel band and number for the step, such that updates to the radio band and channel number will update the frequency value to the corresponding absolute frequency. The reverse is also true, changing the frequency value causes the value of the channel number to be updated.
Preset	1.00 GHz
Min	10.00 MHz
Max	Hardware Dependant: Option 503 = 3.6 GHz Option 504 = 3.9 GHz Option 506 = 6.00 GHz
Initial S/W Revision	A.05.00

Power

Allows you to specify a power value for the current step.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:AMPLitude <double>` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:AMPLitude?`
Example	:SOUR:LIST:STEP2:SET:AMPL –50dBm :SOUR:LIST:STEP2:SET:AMPL?
Notes	SCPI is supported after A.09.40
Notes	Amplitude corrections can be specified for use with the source. In the event of amplitude corrections being applied, the valid ranges for the RF power do not change dependant on the current amplitude correction setting. Instead, if the combination of RF power + amplitude correction is higher or lower than the source output range, the Source Unleveled bit is set and the “Source Unleveled” indicator will appear on status panel to indicate that the source cannot maintain the output power that has been requested. The multiport adapter RFIO TX ports and GPS ports cannot ensure power accuracy when power setting is lower than –130dBm, this power setting value is defined by the sum of RF Power setting and related amplitude correction value. But user settable value could be lower than this limit. When application detected there exists power setting lower than –130dBm on MPA RFIO TX ports, then popup warning message . When application detected there exists power setting lower than –130dBm on MPA GPS ports, then popup warning message . These are only warning messages, and check is performed when RF is ON.
Notes	The Min and Max value here defined UI settable amplitude range. This range is larger than actual amplitude range with level accuracy defined in spec.
Dependencies	The RF power is dependent on the RF output port and frequency, such that the current frequency and selected output port determine the valid range of power values.
Preset	–100 dBm
Min	The range of values depends on the current frequency and selected RF output port. Please refer to "RF Power" on page 772 and the table RF Power Range for the valid ranges.
Max	The range of values depends on the current frequency and selected RF output port. Please refer to "RF Power" on page 772 and the table RF Power Range for the valid ranges.
Initial S/W Revision	A.05.00

Waveform

Allows you access to the sub-menus for selecting the waveform to be played back during the current step. Pressing this key also changes the central display area to show the Waveform File Selection view.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:WAVeform <string>` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:WAVeform?`
Example	:SOUR:LIST:STEP2:SET:WAV “CW” :SOUR:LIST:STEP2:SET:WAV?
Notes	SCPI is supported after A.09.40
Remote Command Notes	String type, takes “Off” | “CW” | “Cont” | “waveform name”

Preset	CW
Range	Waveform | Continue Previous | CW | Off
Initial S/W Revision	A.05.00

CW

Sets the current step to output a CW tone.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform
Example	:SOUR:LIST:STEP2:SET:WAV “CW”
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Selected Waveform

Inserts the currently selected waveform in the waveform selection view as the waveform for playback during the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform
Example	:SOUR:LIST:STEP2:SET:WAV “waveform name”
Notes	SCPI is supported after A.09.40 If the selected waveform contains header (which contains ARB play parameters), source list sequence will automatically apply header settings of the selected waveform in that step.
Initial S/W Revision	A.05.00

Continue Previous

Sets the current step to continue with playback of the waveform from the previous step. When continuing the previous waveform, the ARB playback will not pause while the source retunes to the new frequency or amplitude that may be defined for the new step.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform
Example	:SOUR:LIST:STEP2:SET:WAV “Cont”
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Off

Disable RF outpu of the current step.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform
Example	:SOUR:LIST:STEP2:SET:WAV “Off”
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Segments on Hard Disk

Allows you access to the sub-menus for loading waveform segments from the hard disk into ARB memory. The default directory is: D: varb.

Pressing this key changes the current view to the Waveform Management View.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Initial S/W Revision	A.05.00

Load Segment To ARB Memory

Allows you to load the selected file into ARB memory. On the front panel you select the file for loading to the ARB memory by highlighting the desired file in the list. Using the SCPI command, you specify the file name on the HDD.

“NVWFM” (none-volatile storage) MSUS (Mass Storage Unit Specifier) is supported in the memory subsystem because the ARB memory cannot be accessed directly. Therefore, files must be downloaded to the instrument hard disk and then loaded into the ARB memory. “NVWFM” MSUS will be mapped to the default directory D: VARB. The SCPI command supports using either “NVWFM” MSUS or specifying a full path. For more information, see Memory Subsystem (Remote Command Only).

If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MMEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:LOAD <string>`
Example	:SOUR:RAD:ARB:LOAD “D: VARB\testwaveform.bin” or :SOUR:RAD:ARB:LOAD “NVWFM:testwaveform.bin”
Notes	Because loading the file involves a delay of unpredictable length, this command should be followed by the query *OPC?, which holds off subsequent commands until the loading operating is complete. <string> – specifies the path name of the file to load from the HDD into ARB memory. It could be a <full path + filename>, or <“NVWFM” MSUS + colon + filename>.

	When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load a file to ARB memory will be rejected with an error. When Include Source is Noand if there is insufficient free ARB memory to load the selected waveform, an error is generated. . If you specify a file over SCPI, but the file is not at the specified location, an error is generated. If you try to load a waveform file but the file contains less than 500 IQ sampes, an error is generated. If you try to load a Signal Studio waveform "*.wfm" which contains invalid waveform header, an error is generated. If the ARB is ON when you load afile to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished. ARB can be loaded into ARB memory even required licenses do not present on the instrument. In this case, a GUI only warning message –800, "Operation complete; Loaded <filename> successfully, but no license <required licenses> installed". User can install required licenses according to <required licenses> string to license it, or multi-pack license it.
Initial S/W Revision	A.05.00

Load All To ARB Memory

Allows you to load all the segment files within the currently selected directory into ARB memory. If a file of the same name already exists within ARB memory, it is overwritten. If you wish to load two segments of the same name, you must rename one of the segments before loading it into ARB memory. To rename a segment, you can either use Windows File Explorer, or the :MEMory:COPY command.

NOTE: When a waveform file is loaded to ARB memory, burst timing adjustments are made automatically, based on whether or not a Multiport Adapter is connected to the test set and powered on. If the connection/power status of the Multiport Adapter is changed after a waveform file has been loaded, it needs to be loaded again.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:LOAD:ALL <string>`
Example	:SOUR:RAD:ARB:LOAD:ALL "D: varb"
Notes	<string> - specifies the directory on the HDD to load the files into ARB memory from. When in Sequence Analyzer mode, and Include Source is Yes, an attempt to load all files from a directory to ARB memory is rejected with an error. When Include Source is No and there is insufficient free ARB memory to load all the waveforms, when the ARB memory is full, the copy ceases, and an error is generated. If you specify a directory over SCPI, but the directory does not exist, an error is generated. If the ARB is ON, a user then loads or deletes file to ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Change Directory...

Allows you to change the currently selected directory on the hard disk. Pressing this key opens a standard windows change directory dialog allowing you to select the new directory of interest.

The current directory is used for manually loading waveform segments into ARB memory for playback, and as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence or a list sequence.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Notes	No remote command, SCPIfront panel only.
Initial S/W Revision	A.05.00

Default Directory...

Allows you to change the default directory. It is used as a search location for waveform segments that are required to be loaded into ARB memory for playback of a waveform sequence, and as a search location for selecting waveforms using SCPI.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments on Hard Disk
Remote Command	`:SOURce:RADio:ARB:DEFault:DIRectory <string>` `:SOURce:RADio:ARB: DEFault:DIRectory?`
Example	:SOUR:RAD:ARB:DEF:DIR “D:\ArbFiles” :SOUR:RAD:ARB:DEF:DIR?
State Saved	Persistent, survives a power cycle and a preset but not saved in the instrument state
Initial S/W Revision	A.05.00

Segments in ARB Memory

Allows you access to the sub-menus for managing the files within ARB memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform
Initial S/W Revision	A.05.00

Delete Segment From ARB Mem

Allows you to remove a segment from ARB playback memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments in ARB Memory
Remote Command	`:SOURce:RADio:ARB:DELete <string>`
Example	:SOUR:RAD:ARB:DEL “testwaveform.bin”
Notes	<string> - specifies the waveform to be deleted from the ARB playback memory. When in Sequence Analyzer mode and Include Source is Yes, an attempt to delete a file from ARB

	memory is rejected with an error. When Include Source is No and you specify a file that does not exist within ARB memory, an error is generated. It is possible to delete files from within the ARB memory when the ARB is ON. However, if you attempt to delete the file that is currently playing an error is generated. It is possible to delete a file from within the ARB memory when the sequencer state is ON and the file is not being used by the List Sequencer. If you attempt to delete a file which is being used by the list sequencer, an error is generated. When sequencer state is On, even if ARB state is On, the selected waveform will not be played. In this case, if the selected waveform is not used in List Sequence, it can be deleted and the ARB state is turned Off. If the ARB is ON and you load a file to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Delete All From ARB Memory

Allows you to remove all segments from ARB playback memory.

Key Path	Source, Modulation Setup, ARB, Select Waveform, Segments in ARB Memory
Remote Command	`:SOURce:RADio:ARB:DELete:ALL`
Example	:SOUR:RAD:ARB:DELete:ALL
Notes	When in Sequence Analyzer mode and Include Source is Yes, an attempt to delete all files from ARB memory is rejected with an error. When Include Source is No and you attempt to delete all files from ARB memory when the ARB is currently playing a file, all files except the one playing are deleted and an error is generated. If you attempt to delete all files from ARB memory when there are waveform files used in "List Sequencer" on page 850 and "Sequencer" on page 851 state is ON, all files except the files currently being used in list sequencer are deleted, and an error is generated. If the ARB is ON and you load a file to ARB memory or delete a file from ARB memory, the playing waveform segment may not keep phase continuity during the ARB memory operation. The waveform will be replayed after the ARB operation is finished.
Initial S/W Revision	A.05.00

Segments on Hard Disk

This key functions the same as "Segments on Hard Disk" on page 877.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform
Initial S/W Revision	Prior to A.09.00

Load Segment To ARB Memory

This key functions the same as "Load Segment To ARB Memory" on page 877.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Load All To ARB Memory

This key functions the same as "Load All To ARB Memory" on page 878.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Change Directory ...

This key functions the same as "Change Directory..." on page 879.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Default Directory ...

This key functions the same as "Default Directory..." on page 879

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform, Segment on Hard Drive
Initial S/W Revision	Prior to A.09.00

Segments in ARB Memory

This key functions the same as "Segments in ARB Memory" on page 879.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform, Segments in ARB Memory
Initial S/W Revision	Prior to A.09.00

Delete Segment From ARB Memory

This key functions the same as "Delete Segment From ARB Mem" on page 879.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform, Segments in ARB Memory, Segment in ARB Memory
Initial S/W Revision	Prior to A.09.00

Delete All From ARB Memory

This key functions the same as "Delete All From ARB Memory" on page 880.

Key Path	Source, List Sequencer, List Sequencer Setup, Waveform, Segments in ARB Memory, Segment in ARB Memory
Initial S/W Revision	Prior to A.09.00

Step Duration

Allows access to the sub-menus for setting up the duration of play for the current step.

The duration can be set to be either the number of times for the ARB file associated with the sequence to play, or a specific time value, or continuous. If the step is set to play a CW tone, the step duration cannot be set to a play count.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:DURation:TYPE TIME | COUNt | CONTinuous | CABort` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:DURation:TYPE?`
Example	:SOUR:LIST:STEP2:SET:DUR:TYPE TIME :SOUR:LIST:STEP2:SET:DUR:TYPE?
Notes	SCPI is supported after A.09.40
Notes	If “Step Duration” is set to “Time” or “Play Count” for the last step, the last step of ARB keeps playing as if set to “Continuous”, until the set “Time” has expired or until the “Play Count” setting is reached. However, you can query Error! Reference source not found. Source Sweeping Condition Message to find out if the current list sequence is complete or not.
Range	Time | Play Count | Continuous | Continuous Abort
Initial S/W Revision	A.05.00

Time

Sets the duration of the current step to be a time value for the length of time the step will play. Pressing this key again opens another menu which allows you to set the time value for the step duration.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Duration
Example	:SOUR:LIST:STEP2:SET:DUR:TYPE TIME
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Duration Time

Allows you to specify the length of time the current step will play.

When Step Duration is Continuous Abort this parameter specifies the maximum duration that the waveform will continue to play after a step trigger is received before the transition to the next waveform will occur. Duration is limited to a maximum of 20 seconds.

If the Transition Time value is longer than the Step Duration Time, an error is generated when initiating a source list sequence. For source list sequence, transition time is included in the step duration length (not occupy additional time). If the Transition Time value is longer than the Step Duration Time, the real step duration length is extended to equal the transition time and cause a timing shift. This check is also described in section Error! Reference source not found. List Sequence Step Validation.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Duration, Time
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:DURation:TCOunt <double>` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:DURation:TCOunt?`
Example	:SOUR:LIST:STEP2:SET:DUR:TCO 1s :SOUR:LIST:STEP2:SET:DUR:TCO?
Notes	SCPI is supported after A.09.40 This SCPI is reused by “Play Count” ,“Duration Time” and “Continuous Abort” according to current Duration Type setting is “Play Count” or “Duraton Time” or “Continuous Abort”. If current “Duration Type” is “Continuous”, then popup error –221,"Settings conflict;Cannot accept time or count input when step duration type is Continuous on step #"
Notes	If “Duration Time” is set for the last step, the last step of ARB keeps playing as if set to “Continuous” after set time expires. However, you can query Source Sweeping Condition Message (:STAT:OPER:COND?) to find out if the current list sequence is complete or not.
Preset	1.00 ms
Min	100 µs
Max	1800 s
Initial S/W Revision	A.05.00

Play Count

Sets the duration of the current step to be an integer value for the number of times (play count) the ARB file is selected for playback during this step. For example, a 5 second ARB will be set to play 5 times during the step.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Duration
Example	:SOUR:LIST:STEP2:SET:DUR:TYPE COUN
Notes	SCPI is supported after A.09.40 This key is unavailable and is grayed out if the current step is configured to CW tone rather than an ARB waveform.
Initial S/W Revision	A.05.00

Header Utilities

Allows access to the header utilities sub-menu. Pressing this key also causes the central display area to change to display the File Header Information view.

Key Path	Source, Modulation Setup, ARB
Dependencies	This key is only available if there is currently a waveform selected for playback. If no waveform is selected, the key is grayed out.
Initial S/W Revision	A.05.00

Continuous

Sets the current step to be played continuously until the next step starts. The waveform will always play completely before transitioning to the next step.

Key Path	Source, List Sequencer, List Sequencer Setup, Step Duration
Example	:SOUR:LIST:STEP2:SET:DUR:TYPE CONT
Notes	SCPI is supported after A.09.40
Initial S/W Revision	A.05.00

Output Trigger

Allows you to specify the trigger output for the current step. The trigger output signal is sent at the start of the step.

When select “On”, trigger event will occur on both Internal and External2 paths. Select “Off” will turn off trigger output.

Key Path	Source, List Sequencer, List Sequencer Setup
Remote Command	`:SOURce:LIST:STEP[1]|2|3…1000:SETup:OUTPut:TRIGger ON | OFF | 1 | 0` `:SOURce:LIST:STEP[1]|2|3…1000:SETup:OUTPut:TRIGger`
Example	:SOUR:LIST:STEP2:SET:OUTP:TRIG ON :SOUR:LIST:STEP2:SET:OUTP:TRIG?
Notes	SCPI is supported after A.09.40
Preset	Off
Range	On|Off
Initial S/W Revision	A.05.00

Step Configuration (Remote Command Only)

This SCPI command is used to configure the List Sequencer and is detailed in the table below. The command is defined such that you send one command per step, with the step number being specified as a subopcode of the SCPI command. Each command includes all the parameter settings for the step. As a step is setup, the values entered are run through several levels of validation.

Remote Command	`:SOURce:LIST:STEP[1]|2|...|4..1000:SETup IMMediate | INTernal | KEY |`

	BUS | EXTernal2, <time>, NONE | PGSM | EGSM | RGSM | DCS1800 | PCS1900 | TGSM810 | GSM450 | GSM480 | GSM700 | GSM850 | BANDI | BANDII | BANDIII | BANDIV | BANDV | BANDVI | BANDVII | BANDVIII | BANDIX | BANDX | BANDXI | BANDXII | BANDXIII | BANDXIV | BANDXIX | USCELL | USPCS | JAPAN | KOREAN | NMT | IMT2K | UPPER | SECOND | PAMR400 | PAMR800 | IMTEXT | PCS1DOT9G | AWS | US2DOT5G | PUBLIC | LOWER | NONE | BAND1 | BAND2 | BAND3 | BAND4 | BAND5 | BAND6 | BAND7 | BAND8 | BAND10 | BAND11 | BAND12 | BAND13 | BAND14 | BAND17 | BAND18 | BAND19 | BAND20 | BAND21 | BAND24 | BAND25 | BAND26 | BAND33 | BAND34 | BAND35 | BAND36 | BAND37 | BAND38 | BAND39 | BAND40 | BAND41 | BAND42 | BAND43 | BANDA | BANDB | BANDC | BANDD | BANDE | BANDF, DOWN | UP, <freq>, <ampl>, <string>, TIME | COUNt | CONTinuous, <time>, ON | OFF | 1 | 0, [<int>], :SOURce:LIST:STEP[1]|2|...|4..1000:SETup?
Example	:SOUR:LIST:STEP1:SET INT, 1ms, PGSM, DOWN, 10, –25 dBm, “GSM_Test1.bin”, TIME, 10ms, OFF, 255
Notes	The parameters are: (There is a total of 11 items in each step, the following is a list of the items in the order they must appear in the remote command.) 1. Step Trigger <**enum**> – specifies the input trigger for the step. For details of the valid types of step trigger see "Step Trigger" on page 853. 2. Transition Time <**time**> – specifies the transition time for the stepin seconds. For details of the valid ranges for the transition time see "Transition Time" on page 855. 3. Radio Band <**enum**> – specifies the radio band for the step. For details of the valid radio bands see "Radio Setup" on page 856. 4. Radio Band Link <**enum**> – specifies the radio band link direction for the step. For details of the valid link types, see "Radio Band Link" on page 873. 5. Frequency/Channel Number <**freq**>/<chan num> – specifies the frequency in Hz or the channel number for the step. The channel number and frequency are combined as one parameter that represents the frequency or channel number depending on the radio band setting. If the radio band is set to NONE, this value is interpreted as a frequency value in Hz. If the radio band is set to a valid band, this value is interpreted as a channel number. For details of the valid ranges for frequency and channel numbers, see "Channel" on page 873 and "Frequency" on page 874 . 6. Power <**ampl**> – specifies the output power for the step in dBm. For details of the valid ranges see "Power" on page 874. 7. Waveform <**string**> – specifies the waveform for playback during the step. The step can output either a new ARB waveform, continue playback of the previous waveform, or output a CW tone. The options for specifying these are: <filename> - plays the specified waveform from the start. The filename value is the name of the file within ARB playback memory, it is does not include the windows path to the file on the HDD. If you enter a filename for a waveform that does not reside within ARB playback memory, an error is generated. CONT – continues playback of the ARB file from the previous step CW – outputs a CW tone OFF – disable RF output 8. Step Duration <**enum**> – specifies the duration of the step. The duration can be specified to be either time, or play count of the ARB file associated with the step, or continuous. If Waveform is set to “CW”, this value cannot be set to Play Count and an error will be generated. If continuous is selected, the following Time or Count value is ignored. For further details of this setting, see "Step

	Duration" on page 882. 9. Time or Count <time/int> – specifies time duration in seconds or play count of the ARB file associated with the step. For further details of this setting, including the valid ranges for the time or play count setting, "Time" on page 882 and "Play Count" on page 883. 10. Output Trigger <Boolean> – specifies the output trigger for the step. For details of the ranges for this setting see "Output Trigger" on page 884.
Dependencies	The range of subopcode values is 1 to 1000 and the value you enter is determined by the number of steps you have configured. For details see "Number of Steps" on page 852. If you attempt to remotely set or query a subopcode that is out of range, an error is generated.
Initial S/W Revision	A.05.00

Step Configuration of Step Trigger parameter list (Remote Command Only)

This SCPI command is to configure “Step Trigger” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:INPut:TRIGger <enum>, <enum>, <enum>, …` `:SOURce:LIST:SETup:INPut:TRIGger?`
Example	:SOUR:LIST:SET:INP:TRIG IMM,INT,EXT2 :SOUR:LIST:SET:INP:TRIG?
Notes	The command is to setup below parameter array of whole list sequence. Step Trigger <**enum**> – specifies the input trigger for the step. For details of the valid types of step trigger see "Step Trigger" on page 853. If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in number of steps will be updated.
Remote Command Notes	IMMediate|INTernal|KEY|BUS|EXTernal2
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Transition Time parameter list (Remote Command Only)

This SCPI command is to configure “Transition Time” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:TRANsition:TIME <time>, <time>, <time>, …` `:SOURce:LIST:SETup:TRANsition:TIME?`
Example	:SOUR:LIST:SET:TRAN:TIME 1ms,1ms,1ms

	:SOUR:LIST:SET:TRAN:TIME?
Notes	The command is to setup below parameter array of whole list sequence. Transition Time <**time**> – specifies the transition time for the stepin seconds. For details of the valid ranges for the transition time see "Transition Time" on page 855 If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in number of steps will be updated.
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Radio Band parameter list (Remote Command Only)

This SCPI command is to configure “Radio Band” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:RADio:BAND <enum>, <enum>, <enum>, …` `:SOURce:LIST:SETup:RADio:BAND?`
Example	:SOUR:LIST:SET:RAD:BAND PGSM, EGSM, RGSM :SOUR:LIST:SET:RAD:BAND?
Notes	The command is to setup below parameter array of whole list sequence. Radio Band <**enum**> – specifies the radio band for the step. For details of the valid radio bands see "Radio Setup" on page 856. If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in number of steps will be updated.
Rem	NONE|PGSM|EGSM|RGSM|DCS1800|PCS1900|TGSM810|GSM450|GSM480|GSM700|GSM850|BANDI|BANDII|BANDIII|BANDIV|BANDV|BANDVI|BANDVII|BANDVIII|BANDIX|BANDX|BANDXI|BANDXII|BANDXIII|BANDXIV|BANDXIX|USCELL|USPCS|JAPAN|KOREAN|NMT|IMT2K|UPPER|SECOND|PAMR400|PAMR800|IMTEXT|PCS1DOT9G|AWS|US2DOT5G|PUBLIC|LOWER|NONE|BAND1|BAND2|BAND3|BAND4|BAND5|BAND6|BAND7|BAND8|BAND10|BAND11|BAND12|BAND13|BAND14|BAND17|BAND18|BAND1

Note	9|BAND20|BAND21|BAND24|BAND25|BAND26|BAND33|BAND34|BAND35|BAND36|BAND37|BAND38|BAND39|BAND40|BAND41|BAND42|BAND43|BANDA|BANDB|BANDC|BANDD|BANDE|BANDF
Command Notes	
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Radio Band Link parameter list (Remote Command Only)

This SCPI command is to configure “Radio Band Link” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:RADio:BAND:LINK <enum>, <enum>, <enum>, …` `:SOURce:LIST:SETup:RADio:BAND:LINK?`
Example	:SOUR:LIST:SET:RAD:BAND:LINK DOWN,UP,UP :SOUR:LIST:SET:RAD:BAND:LINK?
Notes	The command is to setup below parameter array of whole list sequence. Radio Band Link <**enum**> – specifies the radio band link direction for the step. For details of the valid link types, see "Radio Band Link" on page 873. If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in number of steps will be updated.
Remote Command Notes	DOWN|UP
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Frequency/Channel Number parameter list (Remote Command Only)

This SCPI command is to configure “Frequency” or “Channel Number” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:CNFRequency <double>, <double>, <double>, …` `:SOURce:LIST:SETup:CNFRequency?`
Example	:SOUR:LIST:SET:CNFR 1GHz,100MHz,100MHz :SOUR:LIST:SET:CNFR? SOUR:LIST:SET:CNFR 124,124,124 :SOUR:LIST:SET:CNFR?
Notes	The command is to setup below parameter array of whole list sequence. Frequency/Channel Number <**freq**>/<chan num> – specifies the frequency in Hz or the channel number for the step. The channel number and frequency are combined as one parameter that represents the frequency or channel number depending on the radio band setting. If the radio band is set to NONE, this value is interpreted as a frequency value in Hz. If the radio band is set to a valid band, this value is interpreted as a channel number. For details of the valid ranges for frequency and channel numbers, see "Channel" on page 873 and "Frequency" on page 874 This SCPI is used to setup/query channel number or frequency setting, according to current Radio Band setting of that step. If Radio Band is “NONE”, then it’s frequency. If Radio Band is not “NONE”, then it’s channel number If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in

	legal step number will be updated.
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Power parameter list (Remote Command Only)

This SCPI command is to configure “Power”parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:AMPLitude <ampl>, <ampl>, <ampl>, …` `:SOURce:LIST:SETup:AMPLitude?`
Example	:SOUR:LIST:SET:AMPL –50dBm,–40dBm,–30dBm :SOUR:LIST:SET:AMPL?
Notes	The command is to setup below parameter array of whole list sequence. Power <**ampl**> – specifies the output power for the step in dBm. For details of the valid ranges see "Power" on page 874. If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in legal step number will be updated.
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Waveform parameter list (Remote Command Only)

This SCPI command is to configure “Waveform” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:WAVeform <string>, <string>, <string>, …` `:SOURce:LIST:SETup:WAVeform?`
Example	:SOUR:LIST:SET:WAV “CW”,”Off”,”CONT” :SOUR:LIST:SET:WAV?
Notes	The command is to setup below parameter array of whole list sequence. Waveform <**string**> – specifies the waveform for playback during the step. The step can output either a new ARB waveform, continue playback of the previous waveform, or output a CW tone. The options for specifying these are: <filename> - plays the specified waveform from the start. The filename value is the name of the file within ARB playback memory, it is does not include the windows path to the file on the HDD. If you enter a filename for a waveform that does not reside within ARB playback memory, an error is generated.

	CONT – continues playback of the ARB file from the previous step CW – outputs a CW tone OFF – disable RF output If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in number of steps will be updated.
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Range	”filename” | “CW” | “Off” | “CONT”
Initial S/W Revision	A.09.40

Step Configuration of Step Duration parameter list (Remote Command Only)

This SCPI command is to configure “Step Duration” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:DURation:TYPE <enum>, <enum>, <enum>, …` `:SOURce:LIST:SETup:DURation:TYPE?`
Example	:SOUR:LIST:SET:DUR:TYPE COUN,TIME,CONT :SOUR:LIST:SET:DUR:TYPE?
Notes	The command is to setup below parameter array of whole list sequence. Step Duration <**enum**> – specifies the duration of the step. The duration can be specified to be either time, or play count of the ARB file associated with the step, or continuous. If Waveform is set to “CW”, this value cannot be set to Play Count and an error will be generated. If continuous is selected, the following Time or Count value is ignored. For further details of this setting, see "Step Duration" on page 882. If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in number of steps will be updated.
Remote Command Notes	TIME | COUNt | CONTinuous
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Duration Time or Play Count parameter list (Remote Command Only)

This SCPI command is to configure “Duration Time” or “Play Count” parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:TOCount <time/int>, <time/int>, <time/int>, …` `:SOURce:LIST:SETup:TOCount?`

Example	:SOUR:LIST:SET:TOC 1s,2s,3s :SOUR:LIST:SET:TOC? :SOUR:LIST:SET:TOC 5,6,7 :SOUR:LIST:SET:TOC?
Notes	The command is to setup below parameter array of whole list sequence. Time or Count <time/int> – specifies time duration in seconds or play count of the ARB file associated with the step. For further details of this setting, including the valid ranges for the time or play count setting, "Time" on page 882 and "Play Count" on page 883. If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in number of steps will be updated. If current "Step Duration" on page 882 is “Continuous”, then generate error –221,"Settings conflict;Cannot accept time or count input when step duration type is Continuous on step #"
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Step Configuration of Output Trigger parameter list (Remote Command Only)

This SCPI command is to configure “Output Trigger”parameter array of the whole List Sequencer at one time. The number of array is same as step number defined in "Number of Steps" on page 852 Number of Steps. As a step is setup, the value entered run through several levels of validation.

Remote Command	`:SOURce:LIST:SETup:OUTPut:TRIGger <bool>, <bool>, <bool>, …` `:SOURce:LIST:SETup:OUTPut:TRIGger ?`
Example	:SOUR:LIST:SET:OUTP:TRIG ON,OFF,ON :SOUR:LIST:SET:OUTP:TRIG?
Notes	The command is to setup below parameter array of whole list sequence. Output Trigger <Boolean> – specifies the output trigger for the step. For details of the ranges for this setting see "Output Trigger" on page 884. If input parameter number exceeds the step number defined by "Number of Steps" on page 852Number of Steps then generate error ", and only those parametes whose index number falls in legal step number will be updated.
Remote Command Notes	ON|OFF|1|0
Dependencies	The range is 1 to 1000 which is determined by the number of steps you have configured. For details see "Number of Steps" on page 852.
Initial S/W Revision	A.09.40

Clear List (Remote Command Only)

This command is the SCPI equivalent of the Clear List UI featuredescribed in.

Remote Command	`:SOURce:LIST:SETup:CLEar`
Example	:SOUR:LIST:SETup:CLE
Initial S/W Revision	A.05.00

Trigger Type

Allows access to the sub-menu for selecting the output trigger type for the list sequencer globally. It cannot be changed between different sequence steps.

Key Path	Source, List Sequencer
Remote Command	`:SOURce:LIST:TRIGgerout:TYPe BEGinningofstep|DATamarker`
Example	:SOUR:LIST:TRIG:TYP BEG :SOUR:LIST:TRIG:TYP?
Notes	SCPI is supported after A.14.00
Preset	BEGinningofstep
Range	BEGinningofstep|DATamarker
Initial S/W Revision	A.14.00

BeginningOfStep

Sets the output trigger type as BeginningOfStep for the whole source sequence.

Key Path	Source, List Sequencer, Trigger Type
Example	:SOUR:LIST:TRIG:TYP BEG
Notes	SCPI is supported after A.14.00
Initial S/W Revision	A.14.00

DataMarker

Sets the output trigger type as DataMarker for the whole source sequence. When DataMarker is selected, which marker to route is also needed to be set.

Key Path	Source, List Sequencer, Trigger Type
Example	:SOUR:LIST:TRIG:TYP DAT
Notes	SCPI is supported after A.14.00
Initial S/W Revision	A.14.00

Marker 1

Sets the output trigger maker routing to Marker 1 for DataMarker in the whole source sequence.

Key Path	Source, List Sequencer, Trigger Type, DataMarker
Example	:SOUR:LIST:TRIG:TYPE:MARK M1
Notes	SCPI is supported after A.14.00
Initial S/W Revision	A.14.00

Marker 2

Sets the output trigger maker routing to Marker 2 for DataMarker in the whole source sequence.

Key Path	Source, List Sequencer, Trigger Type, DataMarker
Example	:SOUR:LIST:TRIG:TYPE:MARK M2
Notes	SCPI is supported after A.14.00
Initial S/W Revision	A.14.00

Marker 3

Sets the output trigger maker routing to Marker 3 for DataMarker in the whole source sequence.

Key Path	Source, List Sequencer, Trigger Type, DataMarker
Example	:SOUR:LIST:TRIG:TYPE:MARK M3
Notes	SCPI is supported after A.14.00
Initial S/W Revision	A.14.00

Marker 4

Sets the output trigger maker routing to Marker 4 for DataMarker in the whole source sequence.

Key Path	Source, List Sequencer, Trigger Type, DataMarker
Example	:SOUR:LIST:TRIG:TYPE:MARK M4
Notes	SCPI is supported after A.14.00
Initial S/W Revision	A.14.00

Manual Trigger Now

Pressing this key provides a software trigger event to the list sequencer. During execution of sequence, if the sequencer is halted on any step that has been configured with a “Manual” step trigger, then this key press will cause the sequencer to continue and execute the step.

Key Path	Source, List Sequencer
Remote Command	No remote command, front panel only.
Initial S/W Revision	A.05.00

Remote Software Trigger (Remote command Only)

During execution of a list sequence, the sequence will halt and wait at any step that has Step Trigger set to "Bus". Sending this command will trigger the step and continue the sequence.

Remote Command	`:SOURce:LIST:TRIGger:INITiate[:IMMediate]`
Example	:SOUR:LIST:TRIG:INIT
Initial S/W Revision	A.05.00

Query List Sequence Initiation Armed Status (Remote Command Only)

This is a blocking SCPI query to determine if source list sequence being initiated successfully or not.

Remote Command	`:SOURce:LIST:INITiation:ARMed?`
Example	:SOUR:LIST:INIT:ARMed?
Notes	The return data is in the following format: Integer
Notes	Query only SCPI. Returning "1" if list sequence has been initiated successfully, returning "0" if not. Once get "0", you can use :SYST:ERR? to query what error happened. Just like "*OPC?", this command can be blocked until event/status "IsSourceSweeping" happens, and then returns. Doing so can help user's script query armed status only once during the time interval of the initiation. As an ancillary SCPI of existing SCPI ":SOUR:LIST:TRIGger[:IMMediate]" (see "Initiate Sequence" on page 851 Initiate Sequence), the right usage of this command is to use it after ":SOUR:LIST:TRIG". If not, this command will return "1" immediately.
Notes	There is an alias SCPI ":SOURce:LIST:TRIGger:INITiation:ARMed?".
Initial S/W Revision	A.09.40

Source Preset

Allows you to preset the source settings to their default values.

Key Path	Source
Remote Command	`:SOURce:PRESet`
Example	:SOUR:PRES

Sweep/Control

Displays a menu that enables you to control time-related measurement parameters and to pause or resume the measurement.

Key Path	Front Panel
Mode	VSA
Initial S/W Revision	A.01060 or later

Pause / Resume

Pauses or resumes acquisition at the end of the current time record acquisition.

Key Path	Sweep Control
Mode	VSA
Initial S/W Revision	A.01060 or later

System

See "System" on page 182

Pre-demod

Accesses pre-demod time domain and frequency domain measurement results and enables you to assign them to traces.

Key Path	Trace/Detector, Data,
Mode	VSA

Search Time

Entire time data (after corrections) that is searched (when Burst search or Sync search is on).

Key Path	Trace/Detector, Data, Pre-demod
Mode	VSA

Time

Time data used as input to demodulation. If Burst or Sync search is on, this is the time data that fulfills the search criteria.

Key Path	Trace/Detector, Data, Pre-demod
Mode	VSA

Demod

Accesses demodulated time domain and frequency domain measurement results and enables you to assign them to traces.

Key Path	Trace/Detector, Data,
Mode	VSA

IQ Meas Time

Demodulated Time Trace.

Key Path	Trace/Detector, Data, Demod
Mode	VSA

IQ Meas Spectrum

Averaged result of successive Inst IQ Meas Spectrum if RMS or Max averaging is on. Otherwise, same as Inst IQ Meas Spectrum.

Key Path	Trace/Detector, Data, Demod
Mode	VSA

Inst IQ Meas Spectrum

Instantaneous (not averaged) FFT of current IQ Meas Time.

Key Path	Trace/Detector, Data, Demod
Mode	VSA

IQ Ref Time

Reconstructed ideal time waveform to compare IQ Meas Time against.

Key Path	Trace/Detector, Data, Demod
Mode	VSA

IQ Ref Spectrum

Averaged result of successive Inst IQ Ref Spectrum if RMS or Max averaging is on. Otherwise, same as Inst IQ Ref Spectrum.

Key Path	Trace/Detector, Data, Demod
Mode	VSA

Inst IQ Ref Spectrum

Instantaneous (not averaged) FFT of IQ Ref Time.

Key Path	Trace/Detector, Data, Demod
Mode	VSA

DemodError

Accesses demodulation error measurement results and enables you to assign them to traces.

Key Path	Trace/Detector, Data,
Mode	VSA

Error Vector Time

Vector difference between IQ Meas Time and IQ Ref Time at each point in time.

Key Path	Trace/Detector, Data, DemodError
Mode	VSA

Error Vector Spectrum

Averaged result of Inst Error Vector Spectrum if RMS or Max averaging is on. Otherwise, same as Inst Error Vector Spectrum.

Key Path	Trace/Detector, Data, DemodError
Mode	VSA

Inst Error Vector Spectrum

FFT of Error Vector Time.

Key Path	Trace/Detector, Data, DemodError
Mode	VSA

IQ Mag Error

Difference in length of the IQ Meas Time vector and IQ Ref Time vector at each point in time. Expressed as a % of Ref Time length.

Key Path	Trace/Detector, Data, DemodError
Mode	VSA

IQ Phase Error

Difference in phase of the IQ Meas Time vector and IQ Ref Time vector at each point in time.

Key Path	Trace/Detector, Data, DemodError
Mode	VSA

Table data

One table is available in the Digital Demod measurement. It is displayed when you choose Symbols/Errors as trace data. The available tabular data changes depending on the modulation format chosen (see Meas Setup, Digital Demod, Format). These values can be obtained using the CALC:DDEM:DATA:TABL commands (see Remote SCPI Commands and Data Queries).

Result name	Available in Demod Format:	Displayed Unit	Remote Name	Remote Unit
EVM (rms)	All but FSK	%rms	EvmRms	%rms
EVM (peak)	All but FSK	%pk	EvmPeak	%pk
EVM (peak) symbol number	All but FSK		EvmPeakSym	
Offset EVM (rms)	OQPSK	%rms	OffsetEvmRms	%rms
Offset EVM (peak)	OQPSK	%pk	OffsetEvmPeak	%pk
Offset EVM (peak) symbol number	OQPSK		OffsetEvmPeakSym	
FSK error (rms)	FSK	%rms	FskErrRms	%rms
FSK error(peak)	FSK	%pk	FskErrPeak	%pk
FSK error (peak) symbol number	FSK		FskErrPeakSym	
Mag error (rms)	All	%rms	MagErrRms	%rms
Mag error (peak)	All	%pk	MagErrPeak	%pk
Mag error (peak) symbol number	All		MagErrPeakSym	
Phase error (rms)	All but FSK	deg	PhaseErrRms	deg
Phase error (peak)	All but FSK	deg	PhaseErrPeak	deg
Phase error (peak) symbol number	All but FSK		PhaseErrPeakSym	
Frequency Error	All but FSK	Hz	FreqErr	Hz
Carrier Offset	FSK	Hz	FskCarrOffs	Hz
SNR(MER)	QPSK, QAM, APSK, VSB	dB	SigToNoise	dB
FSK Deviation	FSK	Hz	FskDev	Hz
Pilot Level	8VSB	dB	PilotLevel	dB
TimeOffset	APSK (triggered)	s	TimeOffset	s
IQ Offset	All but FSK or VSB	dB	IqOffset	dB
Amplitude Droop	MSK2, PSK (except QPSK, OQPSK)	dB/sym	AmpDroop	dB/sym
Rho	QPSK, OQPSK		Rho	
Quadrature Error	All but BPSK, VSB, FSK	deg	QuadErr	deg

IQ Gain Imbalance	All but BPSK, VSB, FSK	dB	IqGainImbalance	dB
Ring2 to Ring1 Ratio	APSK		R2Ratio	
Ring3 to Ring1 Ratio	APSK32		R3Ratio	
Peak EVM (rms)	EDGE	%	PeakEvmRms	%
95% EVM	EDGE	%	NinetyFivePercentEvm	%
H1	CPM (FM)		H1	
H2	CPM (FM)		H2	

Key Path	Trace/Detector
Mode	VSA

Response

Accesses data that characterize the equalizer response and enables you to assign them to traces.

Key Path	Trace/Detector, Data,
Mode	VSA

Channel Frequency Response

FFT of Equalizer Freq Response.

Key Path	Trace/Detector, Data, Response
Mode	VSA

Equalizer Impulse Response

Impulse response of the adaptive equalizer (no data is available if equalizer is off).

Key Path	Trace/Detector, Data, Response
Mode	VSA

Data 5

Selects register 5 for assignment of trace data.

Key Path	Trace/Detector, Data, Register

Mode	VSA
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Data 6

Selects register 6 for assignment of trace data.

Key Path	Trace/Detector, Data, Register
Mode	VSA
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

Limit Test (SCPI Only)

Enables you to enable or disable the Limit Test function for each Trace when the Trace supports the Limit Test function.

When enabled, if the limit test fails on the trace, “FAIL” is shown on the Meas Bar. Otherwise, “PASS” is shown.

Available only for the EVM measurement.

Mode	VSA, LTE, LTETDD
Measurement	<meas>:=EVM
Remote Command	`:CALCulate:<meas>:TRACe[1]|2|...|4:LIMit:VISible OFF|ON|0|1` `:CALCulate:<meas>:TRACe[1]|2|...|4:LIMit:VISible?`
Example	CALC:EVM:TRAC1:LIM:VIS ON CALC:EVM:TRAC1:LIM:VIS?
Notes	On the LTE/LTETDD EVM measurement, the following trace data is supported: In-band Emissions Eq Ch Freq Resp Per Slot Limit data can be queried by :CALC:EVM:DATA[1]|2|3|4? LL|UL command.
Preset	0
State Saved	Saved in instrument state.
Initial S/W Revision	A.08.00

Trigger

See ___ on page X

Free Run

See ___ on page X

Video

See ___ on page X

Trigger Level

See ___ on page X

Trig Slope

See ___ on page X

Trig Delay

See ___ on page X

Trig Holdoff

See ___ on page X

Holdoff Type

See ___ on page X

External 1

See ___ on page X

Trigger Level

See ___ on page X

Trig Slope

See ___ on page X

Trig Delay

See ___ on page X

Trig Holdoff

See ___ on page X

Holdoff Type

See ___ on page X

Trig Reference Line

See ___ on page X

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

NOTE In products that run multiple instances of the X-Series Application, all instances use the same location to save User Preset state. So Save User Preset of one instance will overwrite the Save User Preset of another instance.

Key Path	Front-panel key
Backwards Compatibility Notes	User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data. In the X-Series, "state" always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users. On ESA and PSA, User Preset affected the entire instrument's state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode. User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.
Initial S/W Revision	Prior to A.02.00

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.

- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	`:SYSTem:PRESet:USER`
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER
Notes	:SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed
Couplings	A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Key Path	User Preset
Remote Command	`:SYSTem:PRESet:USER:ALL`
Example	:SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL
Notes	Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state.
Couplings	A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode.

	Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Initial S/W Revision	Prior to A.02.00

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

Key Path	User Preset
Remote Command	`:SYSTem:PRESet:USER:SAVE`
Example	:SYST:PRES:USER:SAVE
Notes	:SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM: STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file.
Initial S/W Revision	Prior to A.02.00

View/Display

Provides a menu for selecting display parameters for the current measurement.

View Presets affect the trace layout, trace data assignment, scaling and formatting but do not affect hardware measurement setup.

Key Path	Front Panel
Mode	VSA
Remote Command	`:DISPlay:DDEMod:VIEW:PRESet QUAD`
Example	DISP:DDEM:VIEW:PRES QUAD

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

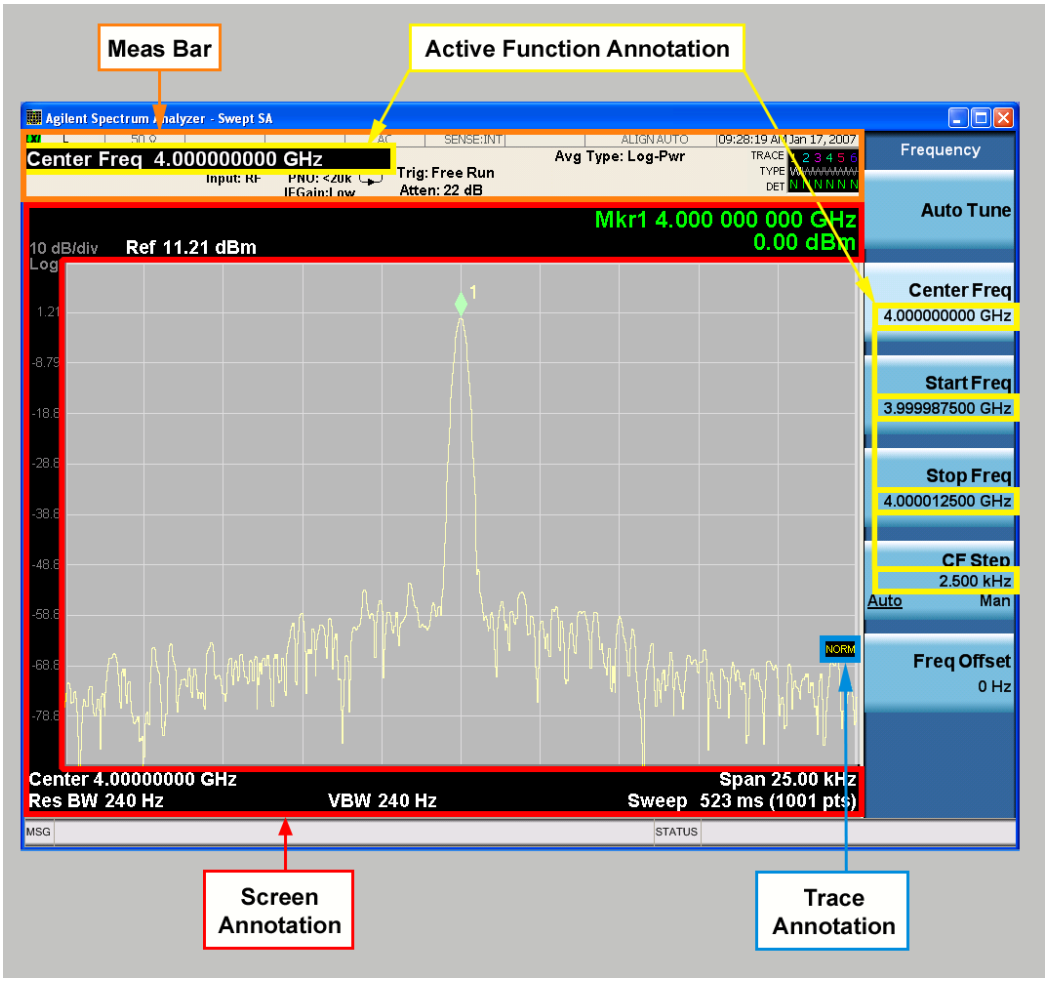
Key Path	Display
Key Path	View/Display
Initial S/W Revision	Prior to A.02.00

Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.



Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

Key Path	View/Display, Display, Annotation
Remote Command	`:DISPlay:ANNotation:MBAR[:STATe] OFF|ON|0|1` `:DISPlay:ANNotation:MBAR[:STATe]?`
Example	DISP:ANN:MBAR OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off.
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Screen

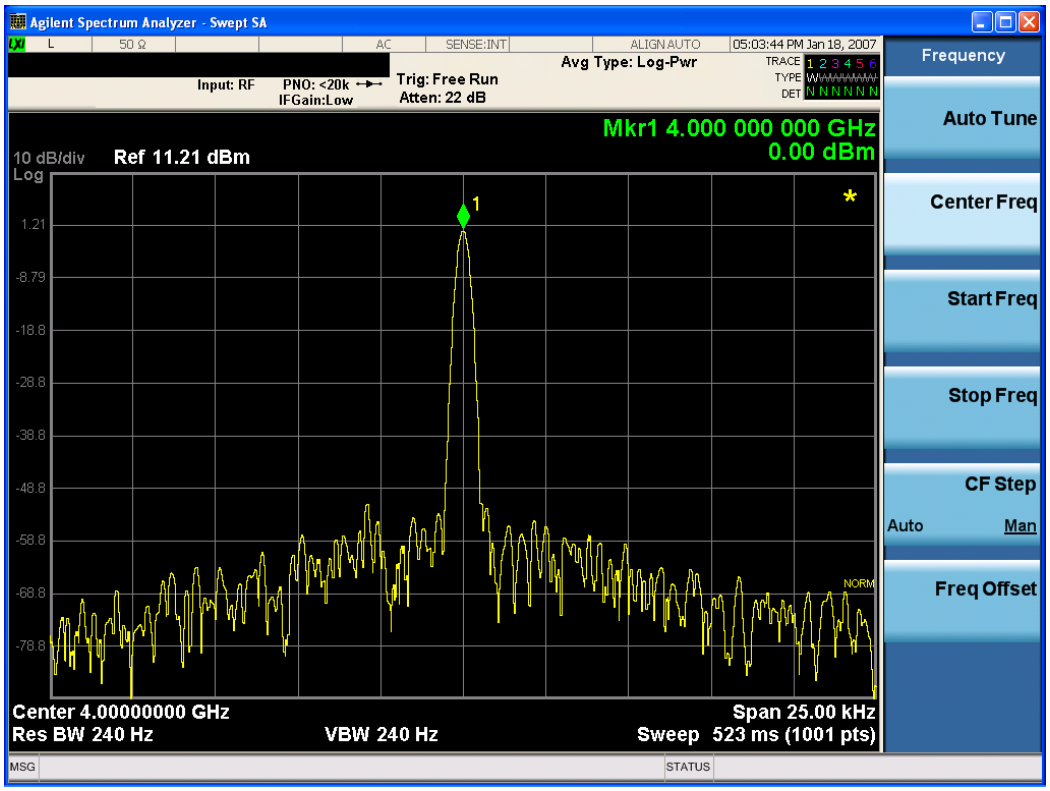
This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

Key Path	View/Display, Display, Annotation
Remote Command	`:DISPlay:ANNotation:SCReen[:STATe] OFF|ON|0|1` `:DISPlay:ANNotation:SCReen[:STATe]?`
Example	DISP:ANN:SCR OFF
Dependencies	Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..



Key Path	View/Display, Display, Annotation
Remote Command	`:DISPlay:ACTivefunc[:STATe] ON|OFF|1|0` `:DISPlay:ACTivefunc[:STATe]?`
Example	DISP:ACT OFF
Dependencies	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset	On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Title

Displays menu keys that enable you to change or clear a title on your display.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

Key Path	View/Display, Display, Title
Mode	All
Remote Command	`:DISPlay:<measurement>:ANNotation:TITLe:DATA <string>` `:DISPlay:<measurement>:ANNotation:TITLe:DATA?`
Example	DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title
Notes	Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters.
Preset	No title (measurement name instead)
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

Key Path	View/Display, Display, Title
Example	The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required.
Notes	Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted).
Preset	Performed on Preset.
Initial S/W Revision	Prior to A.02.00

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

Key Path	View/Display, Display
Remote Command	`:DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF|ON|0|1` `:DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]?`
Example	DISP:WIND:TRAC:GRAT:GRID OFF
Notes	The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis.
Preset	On
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

Key Path	View/Display, Display
Initial S/W Revision	Prior to A.02.00

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

Key Path	View/Display, Display, System Display Settings
Remote Command	`:DISPlay:WINDow[1]:ANNotation[:ALL] OFF|ON|0|1` `:DISPlay:WINDow[1]:ANNotation[:ALL]?`
Example	:DISP:WIND:ANN OFF
Preset	On (Set by Restore Misc Defaults)
State Saved	Not saved in instrument state.
Backwards Compatibility Notes	The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected.
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The Themes option is the same as the Themes option under the Display and Page Setup dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	`:MMEMory:STORe:SCReen:THEMe TDColor | TDMonochrome | FCOLor | FMONochrome` `:MMEMory:STORe:SCReen:THEMe?`
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color | 3D Mono | Flat Color | Flat Mono
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

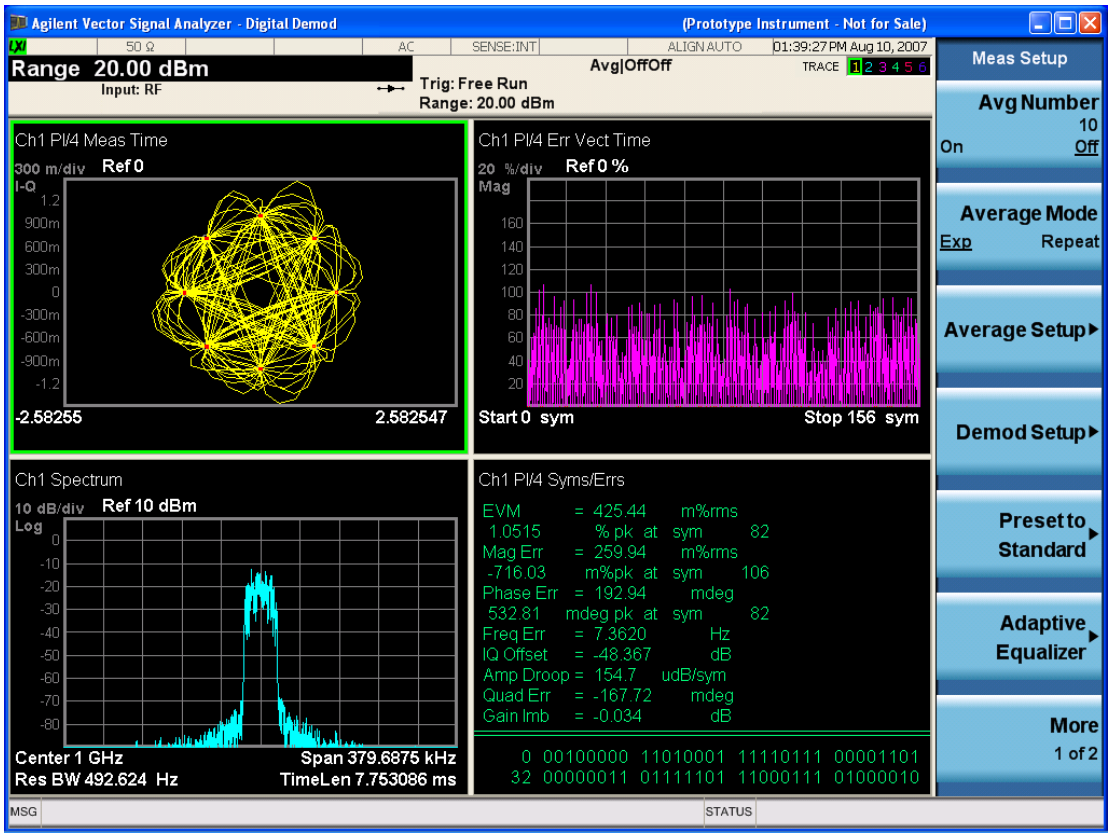
Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Preset View: Demod Quad

Displays a quad layout with the IQ Meas Time in trace 1, Spectrum in trace 2, Error Vector Time in trace 3, and the Symbol/Error table in trace 4.

Key Path	View/Display
Mode	VSA


Agilent Vector Signal Analyzer - Digital Demod
(Prototype Instrument - Not for Sale)
50 Ω
AC
SENSE:INT
ALIGN AUTO
01:39:27 PM Aug 10, 2007
Range 20.00 dBm
Input: RF
Avg|Off|Off
TRACE 1 2 3 4 5 6
Trig: Free Run
Range: 20.00 dBm
Ch1 PI/4 Meas Time
300 m/div Ref 0
I-Q
-2.58255
2.582547
Ch1 PI/4 Err Vect Time
20 %/div Ref 0 %
Mag
Start 0 sym
Stop 156 sym
Ch1 Spectrum
10 dB/div Ref 10 dBm
Log
Center 1 GHz
Res BW 492.624 Hz
Span 379.6875 kHz
TimeLen 7.753086 ms
Ch1 PI/4 Syms/Errs
EVM = 425.44 m%rms
1.0515 % pk at sym 82
Mag Err = 259.94 m%rms
-716.03 m%pk at sym 106
Phase Err = 192.94 mdeg
532.81 mdeg pk at sym 82
Freq Err = 7.3620 Hz
IQ Offset = -48.367 dB
Amp Droop = 154.7 udB/sym
Quad Err = -167.72 mdeg
Gain Imb = -0.034 dB
0 00100000 11010001 11110111 00001101
32 00000011 01111101 11000111 01000010
Meas Setup
Avg Number
10
On Off
Average Mode
Exp Repeat
Average Setup
Demod Setup
Preset to Standard
Adaptive Equalizer
More
1 of 2
MSG
STATUS