

N9080A LTE Measurement Application User's and Programmer's Reference

This manual provides documentation for the following X-Series Analyzers:

MXA Signal Analyzer N9020A

EXA Signal Analyzer N9010A



Agilent Technologies

Manufacturing Part Number: N9080-90001

Printed in USA

August 2008

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[:SENSe]:EVM:ULINK:PROFile:AUTO:PUSCh:RB:StARt?	413
[:SENSe]:EVM:ULINK:PROFile:AUTO:PUSCh:SSLot <integer>	406
[:SENSe]:EVM:ULINK:PROFile:AUTO:PUSCh:SSLot?	406
[:SENSe]:EVM:ULINK:PROFile:AUTO:PUSCh?	399
[:SENSe]:EVM:ULINK:PROFile:EXCLude:ALL	395
[:SENSe]:EVM:ULINK:PROFile:INCLude:ALL	395
[:SENSe]:EVM:ULINK:PROFile:USER<n>:CID <integer>	402
[:SENSe]:EVM:ULINK:PROFile:USER<n>:CID?	402
[:SENSe]:EVM:ULINK:PROFile:USER<n>:DELeTe	402
[:SENSe]:EVM:ULINK:PROFile:USER<n>:HOPPing:GROup OFF ON 0 1	404
[:SENSe]:EVM:ULINK:PROFile:USER<n>:HOPPing:GROup?	404
[:SENSe]:EVM:ULINK:PROFile:USER<n>:HOPPing:SEQuence OFF ON 0 1	405
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[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUCCh INCLude EXCLude	398
[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUCCh:ADD:SLOT<integer>	447
[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUCCh:CSHift <integer>	439
[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUCCh:CSHift:COUPle OFF ON 0 1	440
[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUCCh:CSHift:COUPle?	440
[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUCCh:CSHift?	439
[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUCCh:DMRS INCLude EXCLude	398
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[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUCCh:DMRS:GROup?	444
[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUCCh:DMRS:PWRBoost <rel_ampl>	446

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[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUCCh:FORMat:COUPle OFF ON 0 1	437
[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUCCh:FORMat:COUPle?	437
[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUCCh:FORMat?	436
[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUCCh:OS INDeX0 INDeX1 INDeX2.	441
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[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUCCh:PWRBoost:COUPle OFF ON 0 1	443
[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUCCh:PWRBoost:COUPle?	443
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[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUCCh:SLOT<m>:DMRS:GROup <integer>	454
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[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUCCh:SLOT<m>:DMRS:PWRBoost <rel_ampl>	455
[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUCCh:SLOT<m>:DMRS:PWRBoost?	455
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[SENSE]:EVM:ULINK:PROFile:USER<n>:PUSCh:DSS?	410
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[SENSE]:EVM:ULINK:PROFile:USER<n>:PUSCh:MODulation:TYPE QPSK QAM16 QAM64	416

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[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:MODulation:TYPE:COUPlE?	416
[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:MODulation:TYPE?	415
[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:MODulation:TYPE?	416
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[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:N:DMRS1?	408
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[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:PWRBoost:COUPlE	418
[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:PWRBoost?	417
[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:RB:END <integer>	413
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[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:RB:END:COUPlE?	414
[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:RB:END?	413
[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:RB:START <integer>	411
[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:RB:START:COUPlE OFF ON 0 1.	412
[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:RB:START:COUPlE?	412
[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:RB:START?	411
[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>: DMRS:PWRBoost <rel_ampl>..	433
[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>: DMRS:PWRBoost?	433
[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>: PWRBoost <rel_ampl>.	430
[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>: PWRBoost?	430
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[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>:DMRS:CSHift <integer>.	432
[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>:DMRS:CSHift?	432
[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>:DMRS:GROUp <integer>	431
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[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>:DMRS:SEQuence <integer>....	431
[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>:DMRS:SEQuence?.	431
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[[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>:MODulation:TYPE?	429

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[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>:POStion?	427
[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>:RB:END <integer>	428
[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>:RB:END?	428
[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>:RB:StARt <integer>	428
[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>:RB:StARt?	428
[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:SSLot:<integer>	406
[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:SSLot?	406
[:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh?	397
[:SENSe]:EVM:ULINK:SYNC:CPLength AUTO NORMAl EXTended	360
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[:SENSe]:EVM:ULINK:SYNC:HSSHift OFF ON 0 1	362
[:SENSe]:EVM:ULINK:SYNC:HSSHift?	362
[:SENSe]:EVM:ULINK:SYNC:IQOCmp OFF ON 0 1	361
[:SENSe]:EVM:ULINK:SYNC:IQOCmp?	361
[:SENSe]:EVM:ULINK:SYNC:PDSWap OFF ON 0 1	362
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[:SENSe]:FREQuency:CENTer:STEP:AUTO OFF ON 0 1	509
[:SENSe]:FREQuency:CENTer:STEP:AUTO OFF ON 0 1	705
[:SENSe]:FREQuency:CENTer:STEP:AUTO?	509
[:SENSe]:FREQuency:CENTer:STEP:AUTO?	705
[:SENSe]:FREQuency:CENTer:STEP[:INCRement] <freq>	509
[:SENSe]:FREQuency:CENTer:STEP[:INCRement] <freq>	705
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[:SENSe]:FREQuency:IQ:CENTer <freq>	704
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[:SENSe]:SWEep:EGATe:DELay <time>	.919
[:SENSe]:SWEep:EGATe:DELay:COMPensation:TYPE OFF SETTled GDELay	.926
[:SENSe]:SWEep:EGATe:DELay:COMPensation:TYPE?	.926
[:SENSe]:SWEep:EGATe:DELay?	.919
[:SENSe]:SWEep:EGATe:HOLDoff <time>	.924
[:SENSe]:SWEep:EGATe:HOLDoff:AUTO OFF ON 0 1	.924
[:SENSe]:SWEep:EGATe:HOLDoff:AUTO?	.924
[:SENSe]:SWEep:EGATe:HOLDoff?	.924
[:SENSe]:SWEep:EGATe:LENGth <time>	.920
[:SENSe]:SWEep:EGATe:LENGth?	.920
[:SENSe]:SWEep:EGATe:METHod LO VIDEo FFT.	.921
[:SENSe]:SWEep:EGATe:METHod?	.921
[:SENSe]:SWEep:EGATe:MINFast?	.927
[:SENSe]:SWEep:EGATe:SOURce EXTernal1 EXTernal2 LINE FRAMe RFBurst TV	.923
[:SENSe]:SWEep:EGATe:SOURce?	.923

[:SENSe]:SWEep:EGATe:TIME <time>	918
[:SENSe]:SWEep:EGATe:TIME?	918
[:SENSe]:SWEep:EGATe:VIEW ON OFF 1 0	914
[:SENSe]:SWEep:EGATe:VIEW?	914
[:SENSe]:SWEep:EGATe[:STATe] OFF ON 0 1	913
[:SENSe]:SWEep:EGATe[:STATe]?	913
[:SENSe]:VECTor ADEMod:FREQuency:CENTer:TRACk OFF ON 0 1	559
[:SENSe]:VECTor ADEMod:FREQuency:CENTer:TRACk?	559
[:SENSe]:VOLTage:IQ:Q:RANGe[:UPPer] <voltage>	693
[:SENSe]:VOLTage:IQ:Q:RANGe[:UPPer]?	693
[:SENSe]:VOLTage:IQ:RANGe:AUTO OFF ON 0 1	690
[:SENSe]:VOLTage:IQ:RANGe:AUTO?	690
[:SENSe]:VOLTage:IQ[:I]:RANGe[:UPPer] <voltage>	691
[:SENSe]:VOLTage:IQ[:I]:RANGe[:UPPer]?	691
[:SENSe]:VOLTage POWER:IQ:MIRRored OFF ON 0 1	693
[:SENSe]:VOLTage POWER:IQ:MIRRored?	693
[:SENSe]RECOding:PLAYback:LOOP OFF ON 0 1	911
[:SENSe]RECOding:PLAYback:LOOP?	911
[:SENSe]RECOding:PLAYback:POSition <time>	909
[:SENSe]RECOding:PLAYback:POSition?	909
[:SENSe]RECOding:PLAYback:STARt <time>	910
[:SENSe]RECOding:PLAYback:STARt:AUTO OFF ON 0 1	910
[:SENSe]RECOding:PLAYback:STARt:AUTO?	910
[:SENSe]RECOding:PLAYback:STARt?	910
[:SENSe]RECOding:PLAYback:STOP <time>	910
[:SENSe]RECOding:PLAYback:STOP:AUTO OFF ON 0 1	910
[:SENSe]RECOding:PLAYback:STOP:AUTO?	910
[:SENSe]RECOding:PLAYback:STOP?	910

Welcome to the X-Series Signal Analyzer Help system!

The online Help system is "context-sensitive". This means that the information displayed when you invoke the Help system depends on the selected Analyzer Mode, Measurement and key.

TIP To view help for any Front-panel key or menu key, press that key with this Help Window open.

To scroll any page vertically (to see the whole of a long topic), press the **Down Arrow** key on the Front Panel to scroll down (or the **Up Arrow** key to scroll up). To locate these keys, see [“Front Panel Keys used by the Help System” on page 83](#).

See [“Navigating the Help Window Without a Mouse” on page 88](#) for complete information about **Using Help without an attached Mouse and Keyboard**. For specific details of how to navigate to topics, see [“Finding a Topic without a Mouse and Keyboard” on page 97](#).

See [“Navigating the Help Window with a Mouse” on page 86](#) to learn about **Using Help with an attached Mouse and Keyboard**, .

You can view Help on the Analyzer itself, or you can **View Help on Another Computer**, by copying the Help files and viewing Help there. For details, see the Section [“Viewing Help on a separate Computer” on page 77](#).

To locate **Other Available Help Resources**, see [“Locating Other Help Resources” on page 76](#).

Key Path

Help

Locating Other Help Resources

All available documentation is present on the Analyzer's hard disk, either as HTML Help or Acrobat PDF files.

In addition to the interactive Windows (HTML) Help system, the Analyzer's hard disk contains Application Notes, tutorial documents, etc.

This same documentation is also included on the Documentation CD shipped with your Analyzer.

To view a list of links to other documentation, click the item "Additional Documentation" in the Contents tab of the Help Window's Navigation Pane.

Many of the supporting documents use the Adobe Acrobat (PDF) file format. You can view PDF files using the pre-installed Adobe Reader software.

The Adobe Reader user interface differs from the Windows Help interface. For full details on how to navigate within Acrobat documents using Adobe Reader, see ["Navigating Acrobat \(PDF\) Files" on page 92](#).

Viewing Help on a separate Computer

You may want to view the help pages *without* having them appear on top of the Analyzer's screen.

There are two separate Help files for each Analyzer Mode, which contain all the same help pages in different formats:

1. A file in HTML Help (CHM) format,
2. A file in Acrobat (PDF) format.

You can copy any of the Help files to another computer, then open and view the help pages in the file on that computer.

Your choice of which file to copy and view may depend on what you want to do with the file (for example, whether you want to print it and read the paper copy, or view it on the computer). The table below compares the relative advantages of the two formats:

Format Type	HTML Help Format (CHM Files)	Acrobat Format (PDF Files)
File Extension	CHM	PDF
Software Required to view file	Microsoft Windows operating system only, with Microsoft Internet Explorer installed.	Free Adobe Reader software can be downloaded for many operating systems, including: Microsoft Windows, Macintosh, Linux, Solaris.
Full Text Search?	Yes	Yes
Printable?	Yes, but with limited control.	Yes. Full print control.
Printable Table of Contents?	No	Yes
Navigable without a Mouse and Keyboard?	Yes, but with some loss of functionality.	No
Has Page Numbers?	No	Yes
Context-Sensitive Display?	Yes, when viewed using the X-Series Analyzer application window.	No
Indexed?	Yes	No
Active Hyperlinks?	Yes	Yes

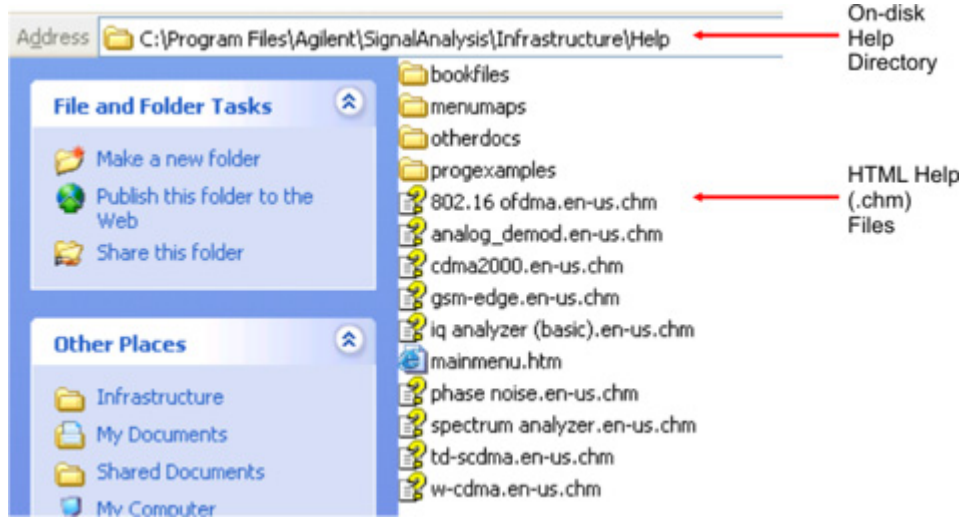
Copying the HTML Help (CHM) Files

You can copy the HTML Help file(s) you need to a separate computer running Microsoft

Windows. Each HTML Help file has a .chm extension.

You can find the HTML Help (.chm) files:

- *Either*, on the documentation CD that came with the Analyzer,
- *Or*, in a special directory on the Analyzer's hard disk. The directory path is:
C:\Program Files\Agilent\SignalAnalysis\Infrastructure\Help
The illustration below shows an example listing of the HTML Help files in this directory, viewed using Windows Explorer.
Depending on which Analyzer software licenses you purchased, the content of the directory on your machine may vary.



NOTE You can open and view the HTML Help files only on a PC that has Microsoft Windows and Microsoft Internet Explorer installed.

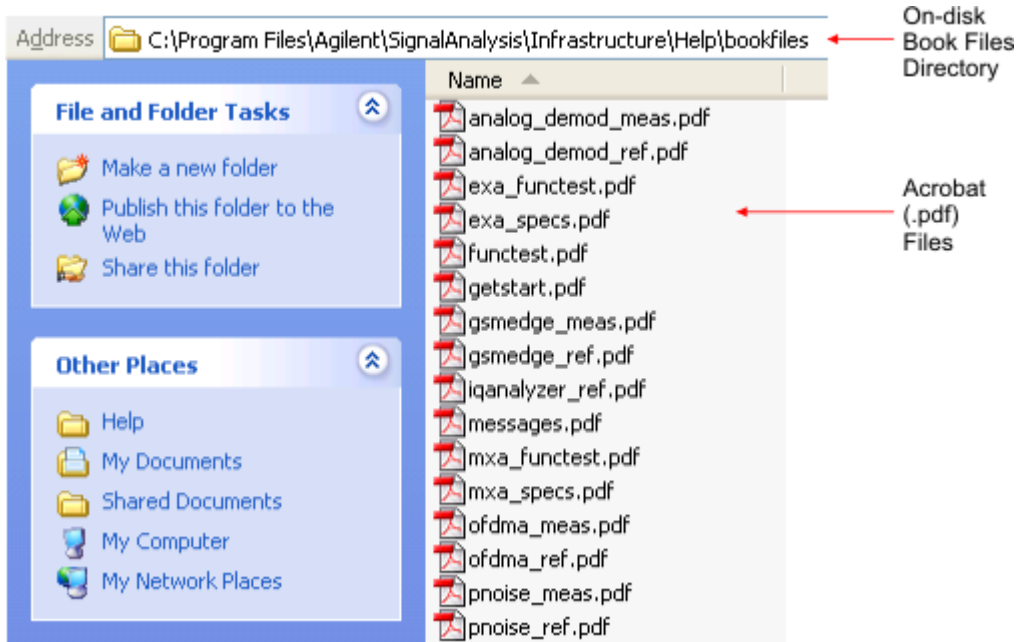
Copying the Acrobat (PDF) Files

You can copy the Acrobat file(s) you need to a separate computer running any of several different operating systems. Each Acrobat file has a .pdf extension.

You can find the Acrobat (.pdf) files:

- *Either*, on the documentation CD that came with the Analyzer,
- *Or*, in a special directory on the Analyzer's hard disk. The directory path is:
C:\Program Files\Agilent\SignalAnalysis\Infrastructure\Help\bookfiles
 - The illustration below shows an example listing of the Acrobat files in this directory, viewed using Windows Explorer.
 - The PDF versions of the help files are named <mode>_ref.pdf, where <mode> is the name of the Analyzer Mode. For example, the name of the PDF file for GSM/EDGE Mode is gsmedge_ref.pdf. (Note that the directory also contains other PDF documents.)
 - When you open any <mode>_ref.pdf document, the title page displays "<Mode> User's and Programmer's Reference", where <Mode> is the name of the Analyzer

- Mode described by the document.
- Depending on which Analyzer software licenses you purchased, the content of the directory on your machine may vary.



How Help is Organized

This topic contains the following sections:

[Help Contents Listing](#)

[System Functions](#)

[Key Descriptions for Each Measurement](#)

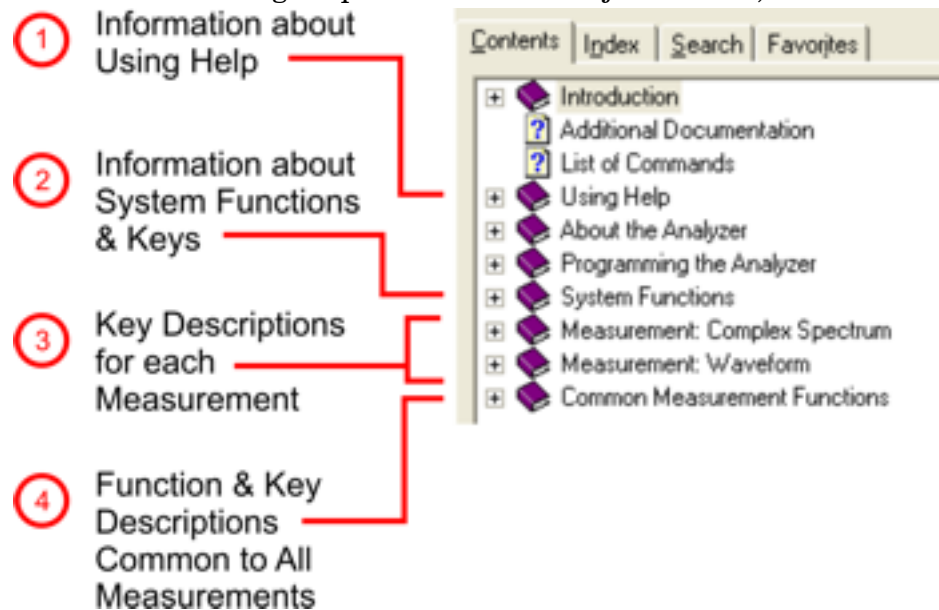
[Key Information for Softkeys](#)

[Common Measurement Functions](#)

Help Contents Listing

The listing under the Contents tab in the Help Window includes a topic for each Front-panel key and each softkey, for each available measurement.

The Contents listing is split into several major sections, as shown below:



Help information is split between these sections as follows:

1. Using Help: this section.
2. System Functions. See [“System Functions” on page 81](#) below.
3. Measurement Functions. See [“Key Descriptions for Each Measurement” on page 81](#) below.
4. Common Measurement Functions. See [“Common Measurement Functions” on page 82](#) below.

System Functions

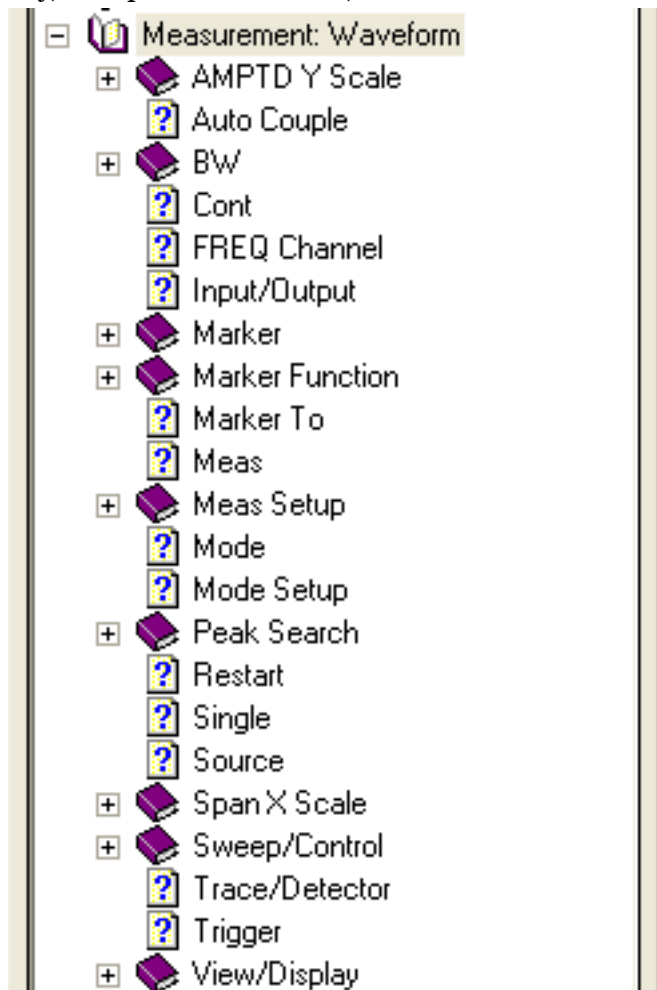
This section contains information for the following keys, which are listed in alphabetical order: **File, Preset, Print, Quick Save, Recall, Save, System, User Preset.**

The functions of these keys do not vary between measurements: they operate the same way, irrespective of which Analyzer measurement you have selected.

The sections for **Recall** and **Save** contain only cross-references to the respective sections in “[Common Measurement Functions](#)” on page 82, and are included here for convenience.

Key Descriptions for Each Measurement

The Contents section for each Measurement is sub-divided into topics for each Front-panel key, in alphabetical order, as shown below.

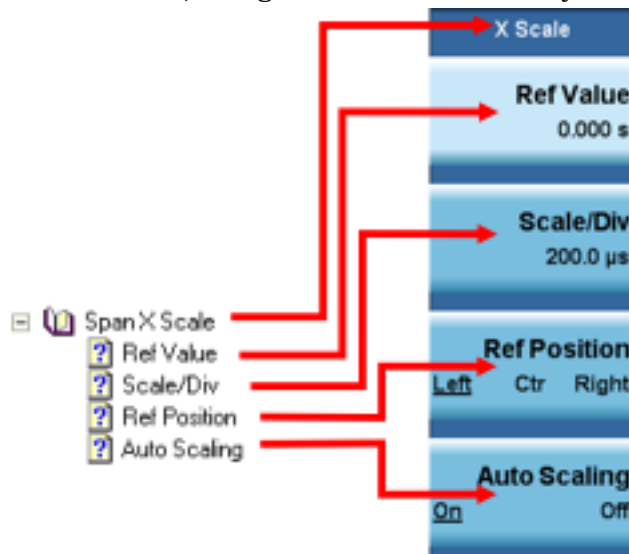


If you don't see a topic for a Front-panel key in the Measurement-specific section, then it is located in the section [System Functions](#).

Key Information for Softkeys

Information for each softkey that appears when you press a Front-panel key (or a softkey

with a submenu) is listed under the entry for that key in the Help Contents. The example below shows the submenu under the **SPAN X Scale** Front-panel key in the "Waveform" Measurement, alongside the actual softkeys for that menu.



In these subsections, all softkeys are listed in the order they appear in their menu (that is, *not* in alphabetical order).

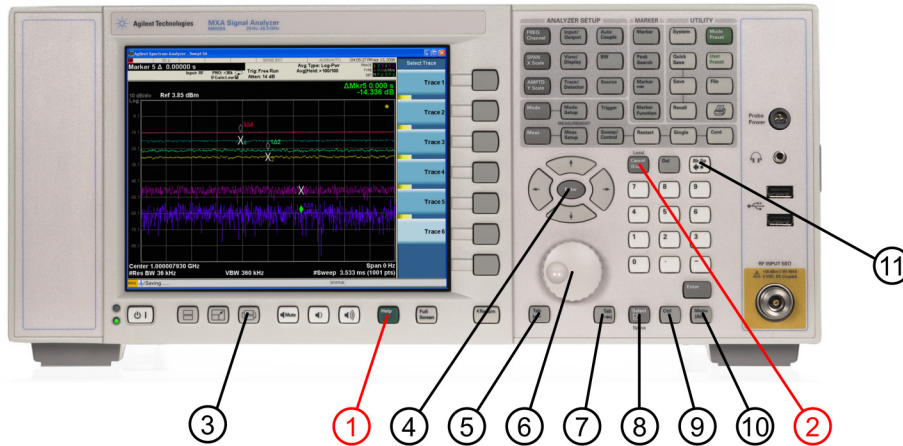
Common Measurement Functions

This section groups together function and key information that is shared between measurements. However, there is a listing for every Front-panel key and subkey in the section for each measurement, so you will generally not need to refer to this section.

The key subsections are listed alphabetically.

Front Panel Keys used by the Help System

The interactive Help system uses the Front-panel keys shown below.

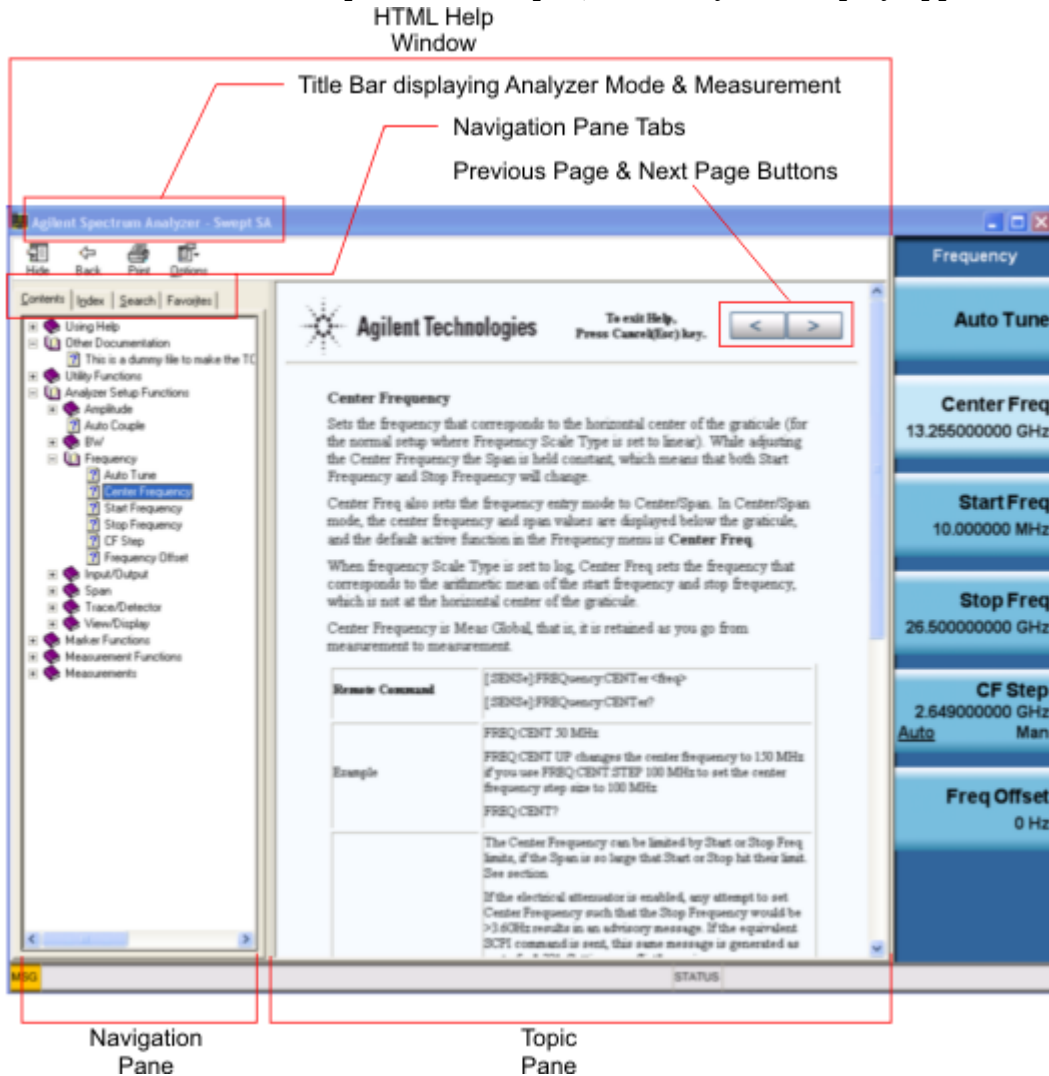


#	Item Name	Description
1	Help Key	Opens Help (displaying the topic for the last key pressed).
2	Cancel (Esc) Key	Exits Help.
3	Next Window Key	Changes the current window pane selection. Use this key to: TBD.
4	Arrow / Enter Keys	A central Enter key, surrounded by four directional arrow keys. Navigates within the Help system.
5	Backward Tab Key	Moves between controls in the Help display.
6	Knob	For future use.
7	Forward Tab Key	Moves between controls in the Help display.
8	Select / Space Key	Navigates within the Help system, in conjunction with other keys.
9	Ctrl Key	Navigates within the Help system, in conjunction with other keys. See Navigating Windows HTML Help (CHM) Files .
10	Alt Key	Navigates within the Help system, in conjunction with other keys. See Navigating Windows HTML Help (CHM) Files .
11	Bk Sp (Backspace) Key	Acts as a "Back" key when navigating the pages of the Help system.

Navigating Windows HTML Help (CHM) Files

HTML Help Window Components

When the interactive Help Window is open, the Analyzer's display appears as below.



The HTML Help Window appears on top of, and to the left of, the measurement display. You can still see and use the current softkey menu when the HTML Help Window is open. However, pressing a softkey when the Help window is open displays Help for that softkey, but does *not* execute the softkey's function.

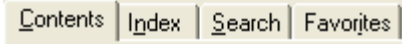
When the Help Window is open, the Analyzer retains its current Mode and Measurement, as shown in the Title Bar.

The HTML Help Window itself consists of two panes, as shown in the diagram above.

On the left is the Navigation Pane, and on the right is the Topic Pane.

The Help Window Navigation Pane

The Navigation Pane is further divided into four tabs: Contents, Index, Search and Favorites, as shown below.



For details of how to switch between these tabs, if you don't have a mouse attached to the Analyzer, see the Section [“To Switch the Active Tab within the Navigation Pane” on page 88](#).

The Help Window Topic Pane

This pane displays the text for the topic that you have selected. It also contains clickable **Previous Page** and **Next Page** buttons (as shown below), which can be used to move to the previous or next page in the Help file.



Basic Help Window Operations

This topic contains the following sections:

[Opening Help](#)

[Getting Help for a Specific Key](#)

[Closing the Help Window](#)

[Viewing Help on How to Use Help](#)

[Exiting Help on How to Use Help](#)

To locate the keys mentioned in this section, see [“Front Panel Keys used by the Help System” on page 83](#).

Opening Help

To access the Help system, press the green **Help** key below the front panel display (shown below) while an Agilent application is running.



Note that the softkeys remain visible when the Help window is open.

Getting Help for a Specific Key

1. If the Help window *is* already open, press the desired key. The relevant Help topic appears.

Note that the function normally invoked by the key is *not* executed when the key is pressed with the Help window open. If you want to execute the key's function, first close Help by pressing the **Cancel (Esc)** key (as described in [“Closing the Help Window” on page 86](#)), then press the key, before opening Help again (if required).

2. If the Help window is *not* already open, press the desired key (which executes the key's function), then press the **Help** key to display the relevant Help page. Help is available for all softkeys, and for all the Front-panel keys listed under the "System Functions" and "Measurement" sections.

For details of how to navigate within the panes of the Help window, see [Navigating Windows HTML Help \(CHM\) Files](#).

Closing the Help Window

To close the Help window, and return to the measurement application, press the **Cancel (Esc)** key (depicted below).



Viewing Help on How to Use Help

With the Help window open, press the green **Help** key again.

The "Using Help" page appears, as shown below.



Exiting Help on How to Use Help

See the Section ["To Go Back or Forward: display the Previously-viewed or Next-viewed Topic in the Topic Pane"](#) on page 90 for details of several methods to accomplish this.

Navigating the Help Window

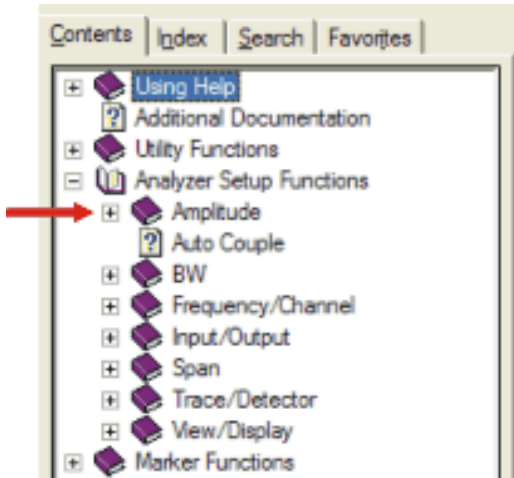
The way you navigate around the HTML Help Window depends on whether you have a mouse and keyboard attached to your Analyzer:

- If you have a mouse and keyboard attached, see the Section [Navigating the Help Window with a Mouse](#).
- If you don't have a mouse and keyboard attached, see the Section [Navigating the Help Window Without a Mouse](#).

Navigating the Help Window with a Mouse

When the HTML Help window is open, you can point-and-click to navigate, as you would when using Help for any Microsoft Windows computer application. The basic navigational features the Help systems of all X-Series Analyzers are as follows:

- If necessary, press the green **Help** key on the Front Panel, as described in “Opening Help” on page 85, to open the HTML Help window.
- Choose the desired topic from the list under the Contents Tab of the HTML Help Window’s Navigation Pane, then click on the topic title to display the first page of the topic.
- To expand the listing of a topic, click on the + icon to the left of the topic’s book icon, as shown below. A list of subtopics and pages appears.

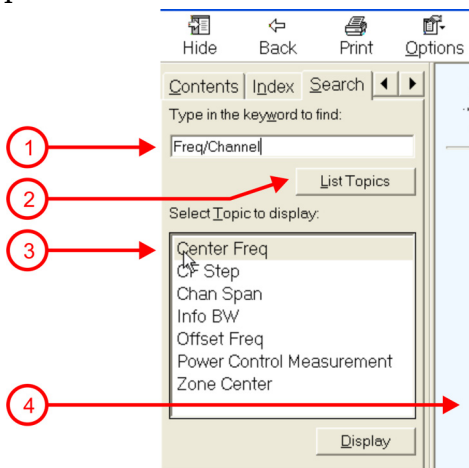


- To move to the Next or Previous Page within the Topic Pane, click the **Next Page** or **Previous Page** Keys (at the top right of the *Topic* Pane), as shown below.



Searching for a Help Topic If you also have a keyboard attached to the Analyzer, you can use the Help system’s full-text search feature to locate help for any topic, by typing in a key name, a topic name, or any other desired text.

Select the "Search" tab of the Help window’s Navigation Pane, then use the following procedure:



1. Type the desired topic name into the Search window as shown in the diagram above. Note that the text search is *not* case-sensitive.

2. Click on the **List Topics** button.
3. *Either:*
Double-click on the desired topic in the list,
Or:
Click on the desired topic to select it, then click the **Display** button beneath the list.
4. The topic is then displayed in the Topic Pane (right-hand side of display).

Navigating the Help Window Without a Mouse

Most features of the Help system can be accessed and navigated without the necessity to attach a mouse or keyboard to the Analyzer. There are, however, a few exceptions to this rule, which are noted in the Section [“Functions that cannot be used without a Mouse and Keyboard” on page 91.](#)

For information about how to perform common tasks in the Help system, click on one of the following links:

[To Toggle the Focus between the Navigation Pane and the Topic Pane](#)

[To Switch the Active Tab within the Navigation Pane](#)

[To Scroll up or down the list of Topics within the Contents or Index Tabs of the Navigation Pane](#)

[To Expand or Collapse a selected topic within the Contents Tab of the Navigation Pane](#)

[To Display a selected Help topic in the Topic Pane from the Contents Tab of the Navigation Pane](#)

[To Display a Help topic in the Topic Pane from the Index Tab of the Navigation Pane](#)

[To Scroll up or down within a topic in the Topic Pane](#)

[To Go to the Next or Previous Page in the Topic Pane](#)

[To Go Back or Forward: display the Previously-viewed or Next-viewed Topic in the Topic Pane](#)

[To Scroll horizontally or vertically within the Contents Tab of the Navigation Pane](#)

[To Print the topic currently displayed](#)

To locate all the keys mentioned in this section, see [“Front Panel Keys used by the Help System” on page 83.](#)

To Toggle the Focus between the Navigation Pane and the Topic Pane Press the **Next Window** key.



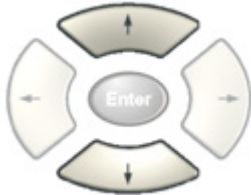
To Switch the Active Tab within the Navigation Pane Perform this procedure to display either the Contents, Index, Search or Favorites tab of the Help window’s Navigation Pane.

Hold down the **Ctrl** key, then press either the **Forward Tab** key, or the **Backward Tab** key.

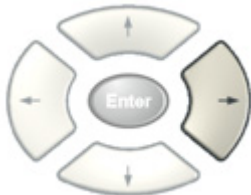


To Scroll up or down the list of Topics within the Contents or Index Tabs of the Navigation Pane

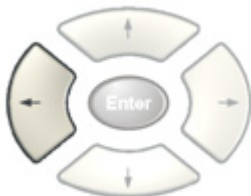
With the focus in the Navigation Pane, press the **Up Arrow** or **Down Arrow** keys.



To Expand or Collapse a selected topic within the Contents Tab of the Navigation Pane With the focus in the Navigation Pane, press the **Right Arrow** key to *expand* the selected topic:

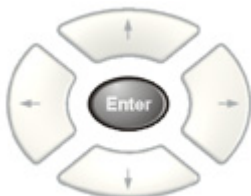


Or press the **Left Arrow** key to *collapse* the selected topic.

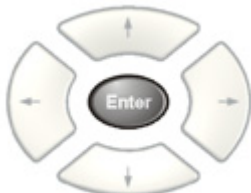


To Display a selected Help topic in the Topic Pane from the Contents Tab of the Navigation Pane

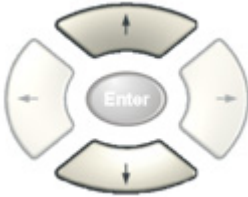
With the focus in the Contents Tab of the Navigation Pane, press the **Enter** key. If the selected topic was not already expanded, it expands in the Navigation Pane.



To Display a Help topic in the Topic Pane from the Index Tab of the Navigation Pane With the focus in the Index Tab of the Navigation Pane, press the **Enter** key.



To Scroll up or down within a topic in the Topic Pane With the focus in the Topic Pane, press either the **Up Arrow** key or **Down Arrow** key.



To Go to the Next or Previous Page in the Topic Pane With the focus in the Topic Pane, press either **Forward Tab** or **Backward Tab** keys



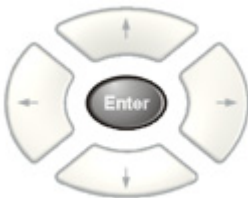
to select the > (**Next Page**) key at the top right of the Pane, if you want to go to the *next* page,



or select the < (**Previous Page**) key at the top right of the Pane, if you want to go to the *previous* page.



Press **Enter**.



To Go Back or Forward: display the Previously-viewed or Next-viewed Topic in the Topic Pane

To go *back*, either:

Hold down the **Alt** key, then press the **Left Arrow** key.



Or:

Press the **Bk Sp** key.

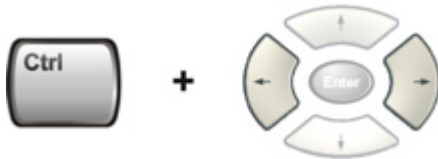


To go *forward*, hold down the **Alt** key, then press the **Right Arrow** key.



(The "Go Forward" operation has no effect unless there have been previous "Go Back" operations)

To Scroll horizontally or vertically within the Contents Tab of the Navigation Pane To scroll *horizontally*: with the focus in the Contents Tab of the Navigation Pane, hold down the **Ctrl** key, then press either the **Left Arrow** or **Right Arrow** keys.



To scroll *vertically*: with the focus in the Contents Tab of the Navigation Pane, hold down the **Ctrl** key, then press either the **Up Arrow** or **Down Arrow** keys.



To Print the topic currently displayed Press the Front-panel **Print** key



Functions that cannot be used without a Mouse and Keyboard The following parts of the HTML Help System *cannot* easily be used without attaching a mouse and keyboard to the Analyzer.

- The menu options at the top of the Help Window, consisting of: **Hide**, **Back**, **Print** and **Options**.
- The functionality of the Search Tab of the Navigation Pane.
- The functionality of the Favorites Tab of the Navigation Pane.

Navigating Acrobat (PDF) Files

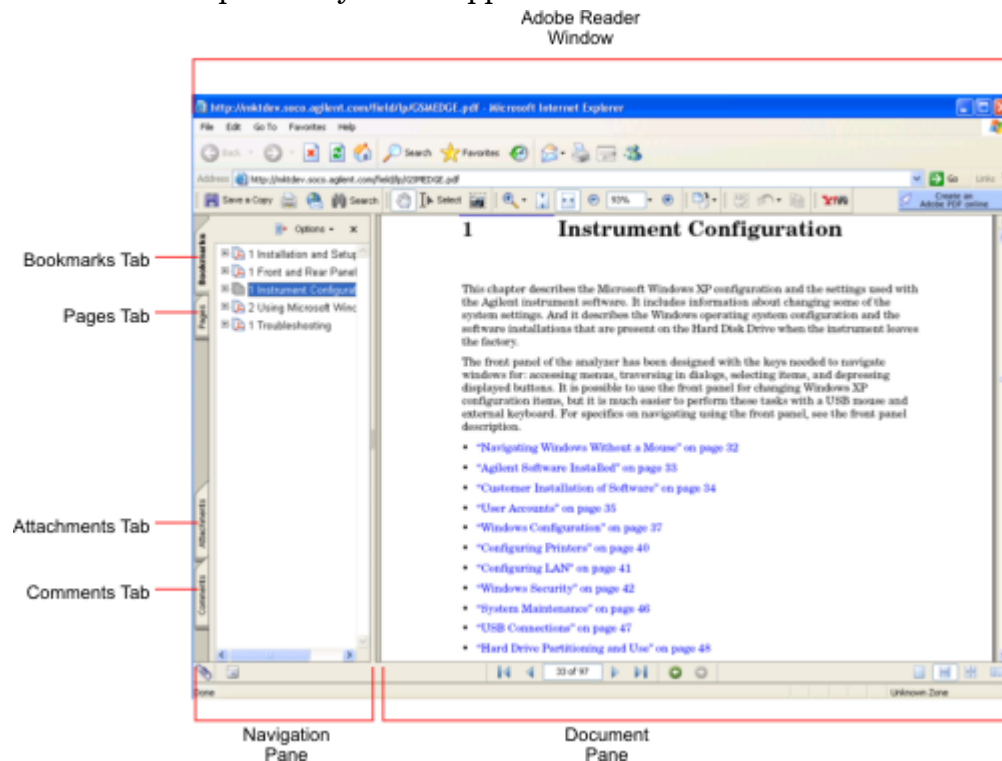
IMPORTANT To navigate PDF files effectively, you must attach a mouse and keyboard to the Analyzer.

If it is not possible to attach a mouse and keyboard to the Analyzer, you should copy the PDF file to a separate computer, then open it on that computer. Every PDF file that is present on the Analyzer's hard disk can also be found on the Documentation CD shipped with the Analyzer. For details, see "[Copying the Acrobat \(PDF\) Files](#)" on page 78.

Adobe Reader Window

When an Adobe Acrobat (PDF) file is open and being viewed, the Analyzer's display appears as below.

Note that, unlike the HTML Help Window, the Acrobat Reader Window is *not* embedded in the Analyzer's Application window. It is a separate window, which can be resized, moved and closed independently of the Application window.



The Adobe Reader Window itself consists of two panes, as shown in the diagram above.

On the left is the Navigation Pane (which may be hidden), and on the right is the Document Pane.

The Navigation Pane is further subdivided into four tabs: Bookmarks, Pages, Attachments

and Comments. Typically, PDF files supplied with the Agilent X-Series Analyzers contain useful content only under the Bookmarks and Pages Tabs: the Attachments and Comments Tabs are not used.

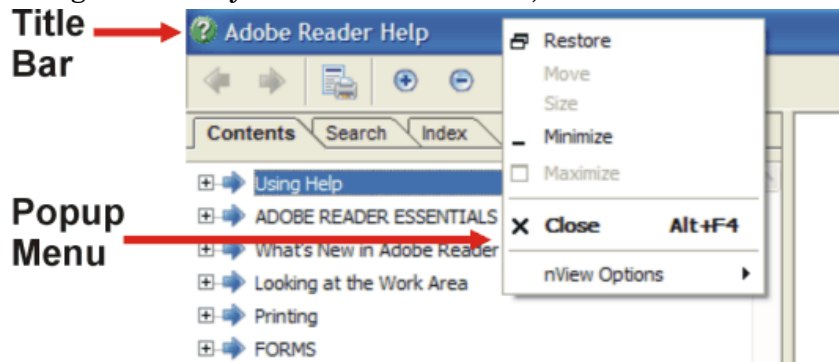
Navigating the Acrobat Reader Window

The online Help for Adobe Reader provides detailed information on how to use the Reader. To access the online Help, do the following:

- With the Adobe Reader window open, click **Help, Adobe Reader Help** in the menu at the top of the screen. This opens the Help window on top of the document window.
- To close the Help window, *either* click the Red X at the top right of the window, *or*



right-click anywhere in the title bar, then select **Close** from the popup menu.

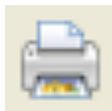


Printing Acrobat Files

NOTE The driver for the appropriate printer must be installed on the Analyzer's hard disk before any file can be printed.

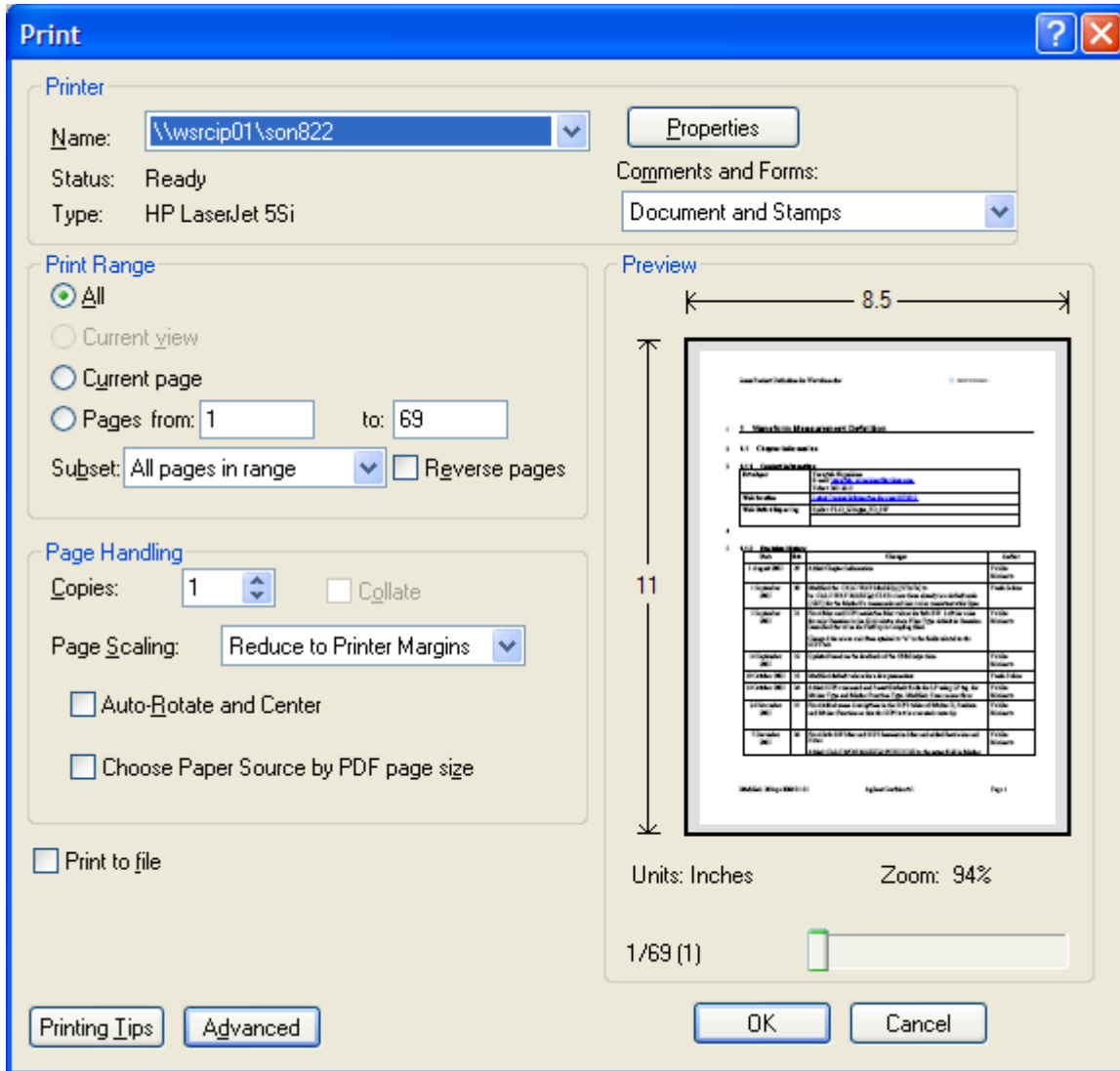
To print all or part of an open Acrobat file, do the following.

1. *Either*,
 - a. click on the Print icon in the Acrobat Reader toolbar,



- b. *or*, select File > Print from the menu.

2. The Acrobat Reader Print dialog opens, as shown below.



3. Choose the desired options within the Print dialog, then click OK to print (or click Cancel to cancel the printing).

NOTE Clicking the Properties button within the Print dialog opens a window containing controls that are specific to the printer model installed. Check the printer manufacturer's documentation for details of these capabilities.

Terms Used in This Documentation

Many special terms are used throughout this documentation. Please refer to the "Getting Started Guide" for detailed explanations of all these terms.

The Section below provides a brief description of special terms used in the Key parameter tables.

Terms used in Key Parameter Tables

The following terms are used in the parameter tables for each Front-panel key or softkey. However, a particular key description may not use all the terms listed.

Term	Meaning
Default Unit	The default measurement unit of the setting.
Default Terminator	Indicates the units that will be attached to the numeric value that you have entered. This default will be used from the front panel, when you terminate your entry by pressing the Enter key, rather than selecting a units key. This default will be used remotely when you send the command without specifying any units after your value(s).
Dependencies/ Couplings	Some commands may be unavailable when other parameters are set in certain ways. If applicable, any such limitations are described here.
Example	Provides command examples using the indicated remote command syntax.
Factory Preset	Describes the function settings after a Factory Preset .
Key Path	The sequence of Front-panel keys that accesses the function or setting.
Knob Increment/Decrement	The numeric value of the minimum increment or decrement that is applied when turning the thumb wheel knob.
Max	The Maximum numerical value that the setting can take.
Min	The Minimum numerical value that the setting can take.
Meas Global	The functionality described is the same in all measurements.
Meas Local	The functionality described is only true for the measurement selected.
Mode Global	The functionality described is the same for all modes.
Preset	In some cases, a Preset operation changes the status of a parameter. If the operation of the key specified is modified by a Preset operation, the effect is described here.

Term	Meaning
Range	Describes the range of the smallest to largest values to which the function can be set. If you try to set a value below the minimum value, the analyzer defaults to the minimum value. If you try to set a value above the maximum value, the analyzer defaults to the maximum value.
Remote Command	Shows the syntax requirements for each SCPI command.
Remote Command Notes	Additional notes regarding Remote Commands.
Resolution	Specifies the smallest change that can be made to the numeric value of a parameter.
SCPI Status Bits/OPC Dependencies	Pressing certain keys may affect one or more status bits. If applicable, details are given here.
State Saved	Indicates what happens to a particular function when the Analyzer state is saved (either to an external memory device or the internal D: drive). It also indicates whether the current settings of the function are maintained if the Analyzer is powered on or preset using Power On Last State or User Preset .

Context Sensitive Help not Available

You have been directed to this page because interactive help for the key you selected is not available.


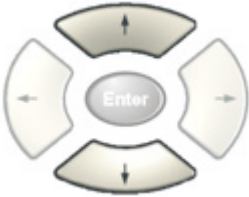
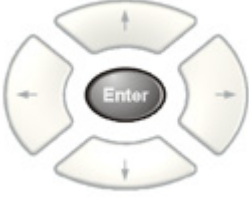
The following information may help you to find related topics of interest:

- If your Analyzer has an attached Mouse and Keyboard, see the Section [“Searching for a Help Topic” on page 87](#).
- If your Analyzer does *not* have an attached Mouse and Keyboard, see the Section [Finding a Topic without a Mouse and Keyboard](#) below.
- If you want to learn how to select on-page links *without* a Mouse attached to your Analyzer, see the Section [Selecting a Hyperlink without a Mouse](#) below.

TIP If you want to understand the organization of Help, see the Section [“How Help is Organized” on page 80](#).




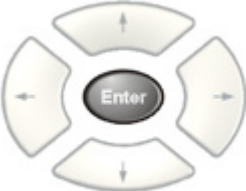
Finding a Topic without a Mouse and Keyboard

Follow this procedure when you want to display a different Help topic by selecting it from the Contents tab of the Help window’s Navigation Pane, but you do not have a mouse attached to the Analyzer.

Perform this action:	Using these keys:
<p>1. If necessary, toggle the focus between the Contents tab of the Navigation Pane (left side of display) and the Topic Pane (right side of display) by pressing the Next Window key.</p> <p>Ensure that the focus is in the <i>Contents tab of the Navigation Pane</i>.</p>	
<p>2. Move up or down the Contents list, by pressing the Up Arrow or Down Arrow keys. Topics become highlighted upon selection.</p>	
<p>3. Display the selected topic, by pressing the Enter key.</p>	

Selecting a Hyperlink without a Mouse

Follow this procedure when you want to select and follow a hyperlink on a Help page, but you do not have a mouse attached to the Analyzer.

Perform this action:	Using these keys:
<p>1. If necessary, toggle the focus between the Contents tab of the Navigation Pane (left side of display) and the Topic Pane (right side of display) by pressing the Next Window key.</p> <p>Ensure that the focus is in the <i>Topic Pane</i>.</p>	
<p>2. Move from link to link in the Topic Pane (right side of display) by pressing the Forward Tab and Backward Tab keys. Links become highlighted upon selection.</p> <p>NOTE: When a Help page is first displayed, no link is selected. Clicking the Forward Tab key once selects the Previous Page key. Clicking the Forward Tab key a second time selects the Next Page key. Clicking the Forward Tab key for a third time selects the first hyperlink on the page.</p> <p>It is sometimes difficult to see the highlighting of the Previous and Next Page keys.</p>	<p>Use the Forward and Backward Tab keys</p>  <p>to select the Previous and Next Page keys</p> 
<p>3. When you have selected the desired link, activate it by pressing the Enter key.</p>	

2

About the Analyzer

The MXA signal analyzer measures and monitors complex RF and microwave signals. The analyzer integrates traditional spectrum measurements with advanced vector signal analysis to optimize speed, accuracy, and dynamic range. The MXA has Windows XP Pro® built in as an operating system, which expands the usability of the analyzer.

With a broad set of applications and demodulation capabilities, an intuitive user interface, outstanding connectivity and powerful one-button measurements, the MXA is ideal for both R&D and manufacturing engineers working on cellular, emerging wireless communications, general purpose, aerospace and defense applications.

Innovative breakthroughs enable the following features:

Figure 2-1 Front-panel General Features

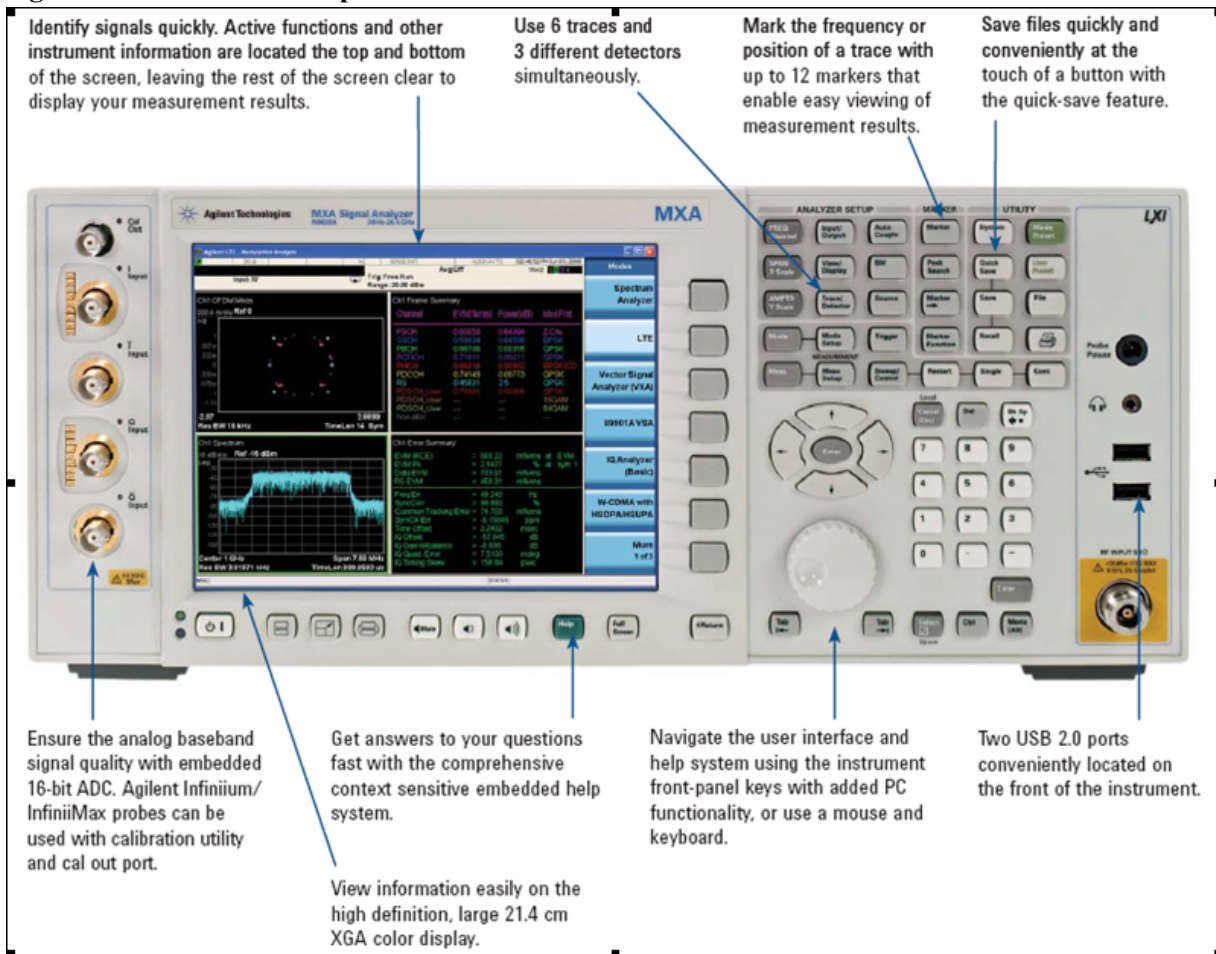
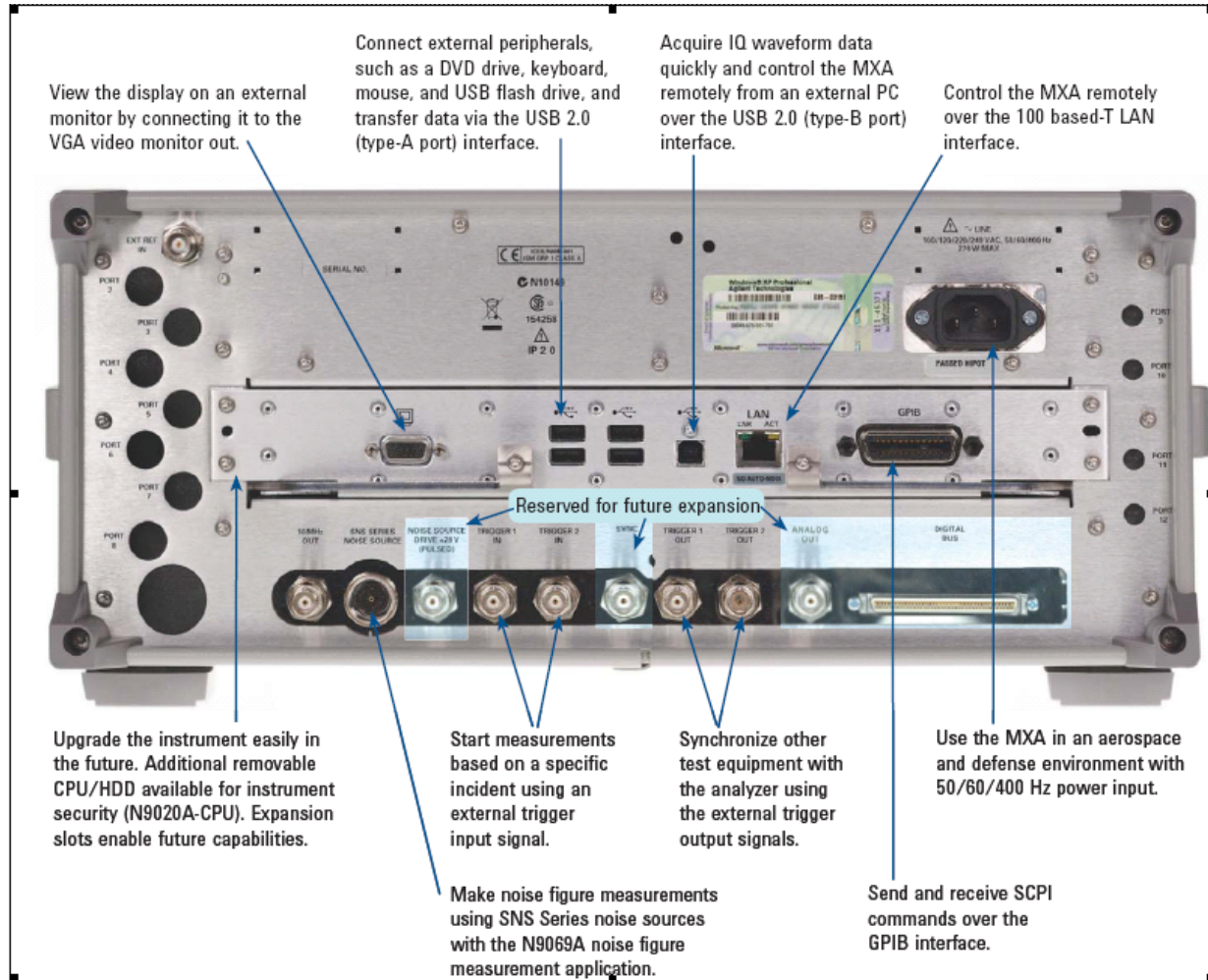


Figure 2-2 Rear-panel Features



Installing Application Software

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

So when you purchase an application, you will receive an entitlement certificate that is used to obtain a license key for that particular measurement application. Enter the license key that you obtain into the N9020A Signal Analyzer to activate the new measurement application. See below for more information.

For the latest information on Agilent Signal Analyzer measurement applications and upgrade kits, visit the following internet URL.

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

Viewing a License Key

Measurement personalities 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 which measurement applications are currently licensed in your analyzer.

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

C:\Programing Files\Agilent\Licensing

NOTE You may want to keep a copy of your license key in a secure location. You can print out a copy of the display showing the license numbers to do this. If you should lose your license key, call your nearest Agilent 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. Follow the instructions that accompany the certificate to obtain your license key.

Installing a license key for the selected application can be done automatically using a USB memory device. To do this, you would put the license file on 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 license management application in the instrument. It is found through the instrument front panel keys at **System, Licensing. . .**, or internally at C:\Programming Files\Agilent\Licensing.

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

Missing and Old 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 assures that you get any improvements and expanded functionality that is available.

Because the software was loaded at the initial purchase, there may be additional measurement applications that are now available. If the application you are interested in licensing is not available, you will need to do a software update. (Press **System, Show, System.**)

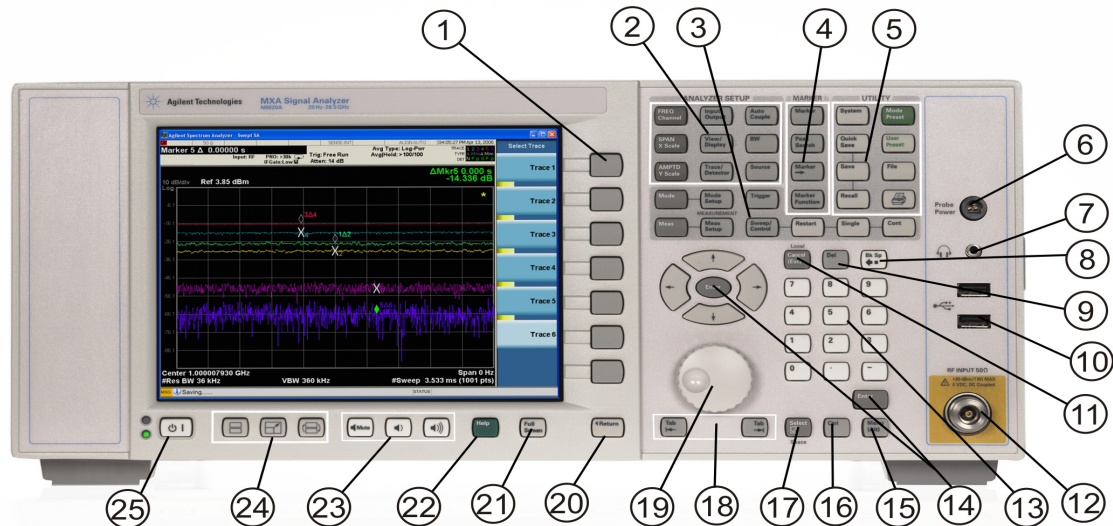
Check the Agilent internet website for the latest software versions available for downloading:

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

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

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

Front-Panel Features



Item		Description
#	Name	
1	Menu Keys	Key labels appear to the left of the menu keys to identify the current function of each key. The displayed functions are dependent on the currently selected Mode and Measurement, and are directly related to the most recent key press.
2	Analyzer Setup Keys	These keys set the parameters used for making measurements in the current Mode and Measurement.
3	Measurement Keys	These keys select the Mode, and the Measurement within the mode. They also control the initiation and rate of recurrence of measurements.
4	Marker Keys	Markers are often available for a measurement, to measure a very specific point/segment of data within the range of the current measurement data.
5	Utility Keys	These keys control system-wide functionality like: <ul style="list-style-type: none"> • instrument configuration information and I/O setup, • printer setup and printing, • file management, save and recall, • instrument presets.
6	Probe Power	Supplies power for external high frequency probes and accessories.
7	Headphones Output	Headphones can be used to hear any available audio output.
8	Back Space Key	Press this key to delete the previous character when entering alphanumeric information. It also works as the Back key in Help and Explorer windows.
9	Delete Key	Press this key to delete files, or to perform other deletion tasks.

About the Analyzer
Front-Panel Features

Item		Description
#	Name	
10	USB Connectors	Standard USB 2.0 ports, Type A. Connect to external peripherals such as a mouse, keyboard, DVD drive, or hard drive.
11	Local/Cancel/(Esc) Key	<p>If you are in remote operation, Local:</p> <ul style="list-style-type: none"> • returns instrument control from remote back to local (the front panel). • turns the display on (if it was turned off for remote operation). • can be used to clear errors. (Press the key once to return to local control, and a second time to clear error message line.) <p>If you have not already pressed the units or Enter key, Cancel exits the currently selected function without changing its value.</p> <p>Esc works the same as it does on a pc keyboard. It:</p> <ul style="list-style-type: none"> • exits Windows dialogs • clears errors • aborts printing • cancels operations.
12	RF Input	Connector for inputting an external signal. Make sure that the total power of all signals at the analyzer input does <i>not</i> exceed +30 dBm (1 watt).
13	Numeric Keypad	Enters a specific numeric value for the current function. Entries appear on the upper left of the display, in the measurement information area.
14	Enter and Arrow Keys	<p>The Enter key terminates data entry when either no unit of measure is needed, or you want to use the default unit.</p> <p>The arrow keys:</p> <ul style="list-style-type: none"> • Increment and decrement the value of the current measurement selection. • Navigate help topics. • Navigate, or make selections, within Windows dialogs. • Navigate within forms used for setting up measurements. • Navigate within tables. <p>NOTE: The arrow keys cannot be used to move a mouse pointer around on the display.</p>
15	Menu/ (Alt) Key	Alt works the same as a pc keyboard. Use it to change control focus in Windows pull-down menus.
16	Ctrl Key	Ctrl works the same as a pc keyboard. Use it to navigate in Windows applications, or to select multiple items in lists.
17	Select / Space Key	Select is also the Space key and it has typical pc functionality. For example, in Windows dialogs, it selects files, checks and unchecks check boxes, and picks radio button choices. It opens a highlighted Help topic.
18	Tab Keys	Use these keys to move between fields in Windows dialogs.
19	Knob	Increments and decrements the value of the current active function.
20	Return Key	Exits the current menu and returns to the previous menu. Has typical pc functionality.
21	Full Screen Key	Pressing this key turns off the softkeys to maximize the graticule display area.

Item		Description
#	Name	
22	Help Key	Initiates a context-sensitive Help display for the current Mode. Once Help is accessed, pressing a front panel key brings up the help topic for that key function.
23	Speaker Control Keys	Enables you to increase or decrease the speaker volume, or mute it.
24	Window Control Keys	These keys select between single or multiple window displays. They zoom the current window to fill the data display, or change the currently selected window. They can be used to switch between the Help window navigation pane and the topic pane.
25	Power Standby/ On	Turns the analyzer on. A green light indicates power on. A yellow light indicates standby mode. NOTE: The front-panel switch is a standby switch, <i>not</i> a LINE switch (disconnecting device). The analyzer continues to draw power even when the line switch is in standby. The main power cord can be used as the system disconnecting device. It disconnects the mains circuits from the mains supply.
26	Q Input	Input port for the Q channel when in differential mode. ^a
27	Q Input	Input port for the Q channel for either single or differential mode. ^a
28	I Input	Input port for the I channel when in differential mode. ^a
29	I Input	Input port for the I channel for either single or differential mode. ^a
30	Cal Out	Output port for probe calibration data. ^a

- a. Status of the LED indicates whether the current state of the port is active (green) or is not in use (dark).

Overview of key types

The keys labeled **FREQ Channel**, **System**, and **Marker Functions** are all examples of front-panel keys. Most of the dark or light gray keys access menus of functions that are displayed along the right side of the display. These displayed key labels are next to a column of keys called menu keys.

Menu keys list functions based on which front-panel key was pressed last. These functions are also dependant on the current selection of measurement application (**Mode**) and measurement (**Meas**).

If the numeric value of a menu key function can be changed, it is called an active function. The function label of the active function is highlighted after that key has been selected. For example, press **AMPTD Y Scale**. This calls up the menu of related amplitude functions. The function labeled **Ref Level** (the default selected key in the Amplitude menu) is highlighted. **Ref Level** also appears in the upper left of the display in the measurement information area. The displayed value indicates that the function is selected and its value can now be changed using any of the data entry controls.

Some menu keys have multiple choices on their label, such as **On/Off** or **Auto/Man**. The different choices are selected by pressing the key multiple times. Take an Auto/Man type of key as an example. To select the function, press the menu key and notice that Auto is underlined and the key becomes

About the Analyzer

Front-Panel Features

highlighted. To change the function to manual, press the key again so that Man is underlined. If there are more than two settings on the key, keep pressing it until the desired selection is underlined.

When a menu first appears, one key label is highlighted to show which key is the default selection. If you press **Marker Function**, the **Marker Function Off** key is the menu default key, and is highlighted.

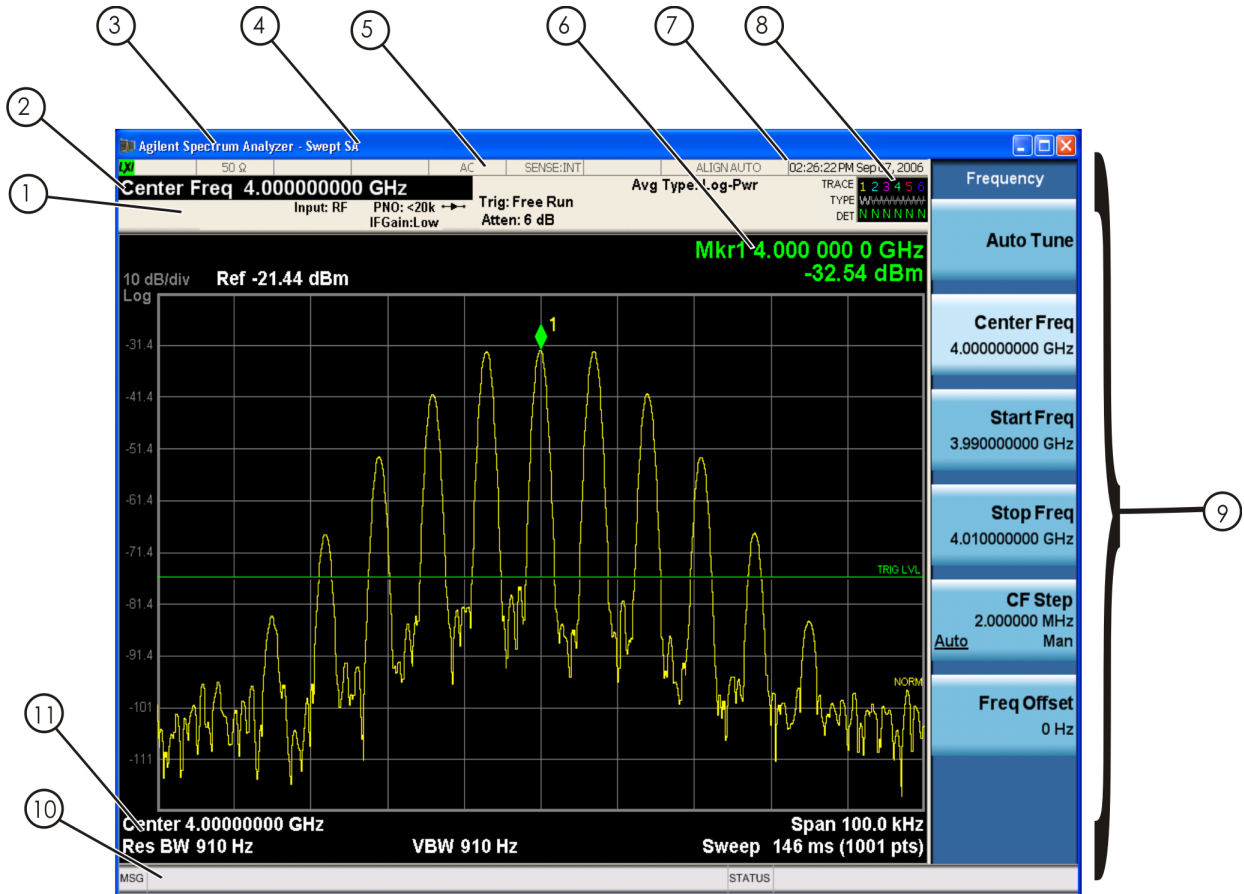
Some of the menu keys are grouped together by a yellow bar running behind the keys near the left side or by a yellow border around the group of keys. When you press a key within the yellow region, such as **Marker Noise**, the highlight moves to that key to show it has been selected. The keys that are linked are related functions, and only one of them can be selected at any one time. For example, a marker can only have one marker function active on it. So if you select a different function it turns off the previous selection. If the current menu is two pages long, the yellow bar or border could include keys on the second page of keys.


In some key menus, a key label is highlighted to show which key has been selected from multiple available choices. And the menu is immediately exited when you press one of the other keys. For example, when you press the **Select Trace** key (in the **Trace/Detector** menu), it brings up its own menu of keys. The **Trace 1** key is highlighted. When you press the **Trace 2** key, the highlight moves to that key and the screen returns to the **Trace/Detector** menu.

If a displayed key label shows a small solid-black arrow tip pointing to the right, it indicates that additional key menus are available. If the arrow tip is not filled in solid then pressing the key the first time selects that function. Now the arrow is solid and pressing it again brings up an additional menu of settings.

Display Annotations

This section describes the display annotation as it is on the Spectrum Analyzer Measurement Application display. Other measurement application modes have some annotation differences.

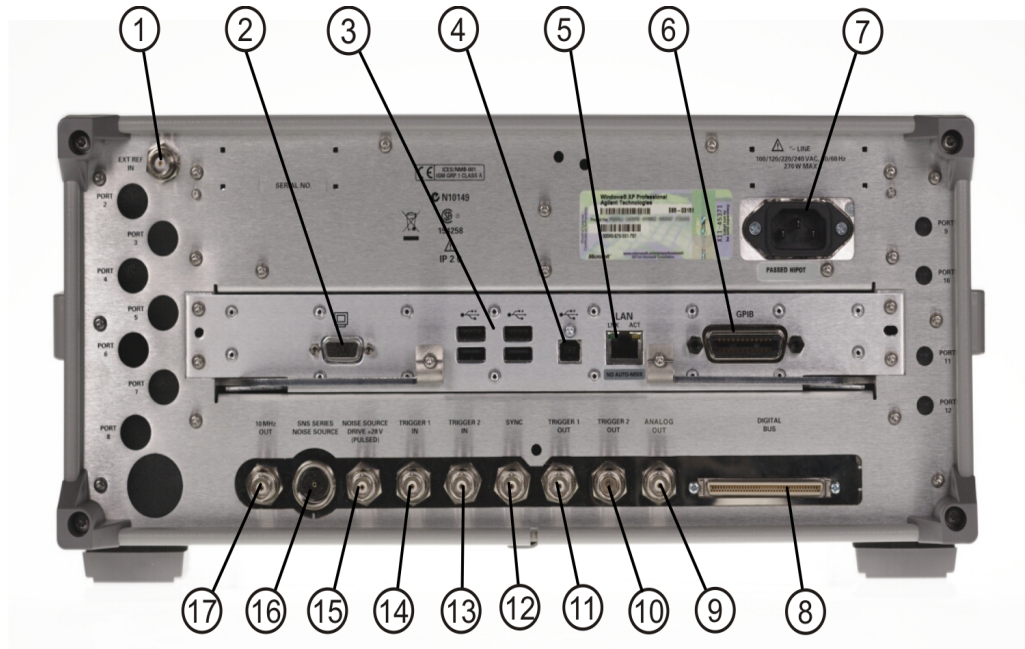


Item	Description	Function Keys
1	Measurement bar - Shows general measurement settings and information.  Indicates single/continuous measurement. Some measurements include limits that the data is tested against. A Pass/Fail indication may be shown in the lower left of the measurement bar.	All the keys in the Analyzer Setup part of the front panel.
2	Active Function (measurement bar) - when the current active function has a settable numeric value, it is shown here.	Currently selected front panel key.
3	Banner - shows the name of the selected application that is currently running.	Mode
4	Measurement title - shows title information for the current measurement, or a title that you created for the measurement.	Meas View/Display, Display, Title

About the Analyzer
Display Annotations

Item	Description	Function Keys
5	Settings panel - displays system information that is not specific to any one application. <ul style="list-style-type: none"> • Input/Output status - green LXI indicates the LAN is connected. RLTS indicate Remote, Listen, Talk, SRQ • Input impedance and coupling • Selection of external frequency reference • Setting of automatic internal alignment routine 	Local and System, I/O Config Input/Output, Amplitude, System and others
6	Active marker frequency, amplitude or function value	Marker
7	Settings panel - time and date display.	System, Control Panel
8	Trace and detector information	Trace/Detector, Clear Write (W) Trace Average (A) Max Hold (M) Min Hold (m) Trace/Detector, More, Detector, Average (A) Normal (N) Peak (P) Sample (S) Negative Peak (p)
9	Key labels that change based on the most recent key press.	Softkeys
10	Displays information, warning and error messages. Message area - single events, Status area - conditions	
11	Measurement settings for the data currently being displayed in the graticule area. In the example above: center frequency, resolution bandwidth, video bandwidth, frequency span, sweep time and number of sweep points.	Keys in the Analyzer Setup part of the front panel.

Rear-Panel Features



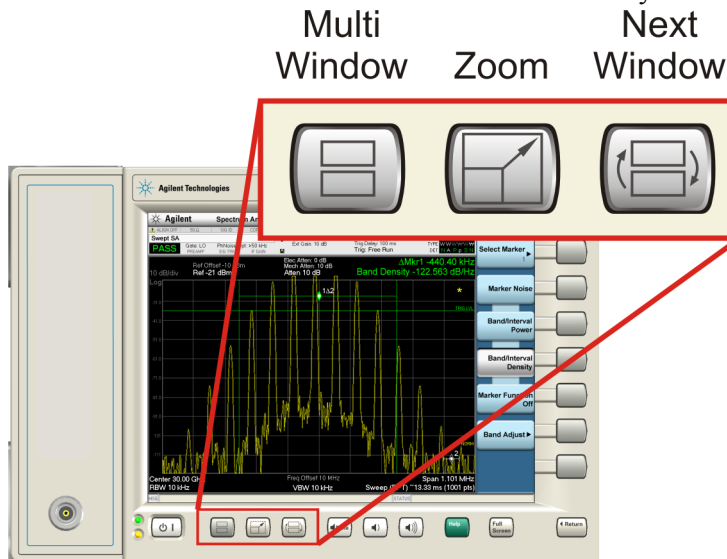
Item		Description
#	Name	
1	EXT REF IN	Input for an external frequency reference signal: For MXA – 1 to 50 MHz For EXA – 10 MHz.
2	MONITOR	Allows connection of an external VGA monitor.
3	USB Connectors	Standard USB 2.0 ports, Type A. Connect to external peripherals such as a mouse, keyboard, printer, DVD drive, or hard drive.
4	USB Connector	USB 2.0 port, Type B. USB TMC (test and measurement class) connects to an external pc controller to control the instrument and for data transfers over a 480 Mbps link.
5	LAN	A TCP/IP Interface that is used for remote analyzer operation.
6	GPIB	A General Purpose Interface Bus (GPIB, IEEE 488.1) connection that can be used for remote analyzer operation.
7	Line power input	The AC power connection. See the product specifications for more details.
8	Digital Bus	Reserved for future use.
9	Analog Out	For use with the Analog Demod measurement application.
10	TRIGGER 2 OUT	A trigger output used to synchronize other test equipment with the analyzer. Configurable from the Input/Output keys.

About the Analyzer
Rear-Panel Features

Item		Description
#	Name	
11	TRIGGER 1 OUT	A trigger output used to synchronize other test equipment with the analyzer. Configurable from the Input/Output keys.
12	Sync	Reserved for future use.
13	TRIGGER 2 IN	Allows external triggering of measurements.
14	TRIGGER 1 IN	Allows external triggering of measurements.
15	Noise Source Drive +28 V (Pulsed)	For use with Agilent 346A, 346B, and 346C Noise Sources
16	SNS Series Noise Source	For use with Agilent N4000A, N4001A, N4002A Smart Noise Sources (SNS).
17	10 MHz OUT	An output of the analyzer internal 10 MHz frequency reference signal. It is used to lock the frequency reference of other test equipment to the analyzer.

Window Control Keys

The instrument provides three front-panel keys for controlling windows. They are **Multi Window**, **Zoom**, and **Next Window**. These are all “immediate action” keys.



Multi-Window

The **Multi Window** front-panel key is not used at this time. It is there to support future functionality.

Key Path Front-panel key

Zoom

Zoom is a toggle function. Pressing once Zooms the selected window; pressing again un-zooms.

When Zoom is on for a window, that window gets 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.

The state of zoom, and which window is zoomed, is saved in State.

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:TILE|ZOOM

Example :DISP:WIND:FORM:ZOOM sets zoomed
:DISP:WIND:FORM:TILE sets un-zoomed

Preset TILE

Next Window

This key selects the next window of the current view. When this key is selected in Help Mode, it toggles focus between the table of contents window and the topic pane window.

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>

Selected Window

One and only one window is always selected.

If a window is not selected, its boundary is gray. The selected window has a green boundary.

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 you 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.

Navigating Windows

When the Next Window key is pressed, the next window in the order of precedence (see below) becomes selected. If the selected window was zoomed, the next window will also be zoomed.

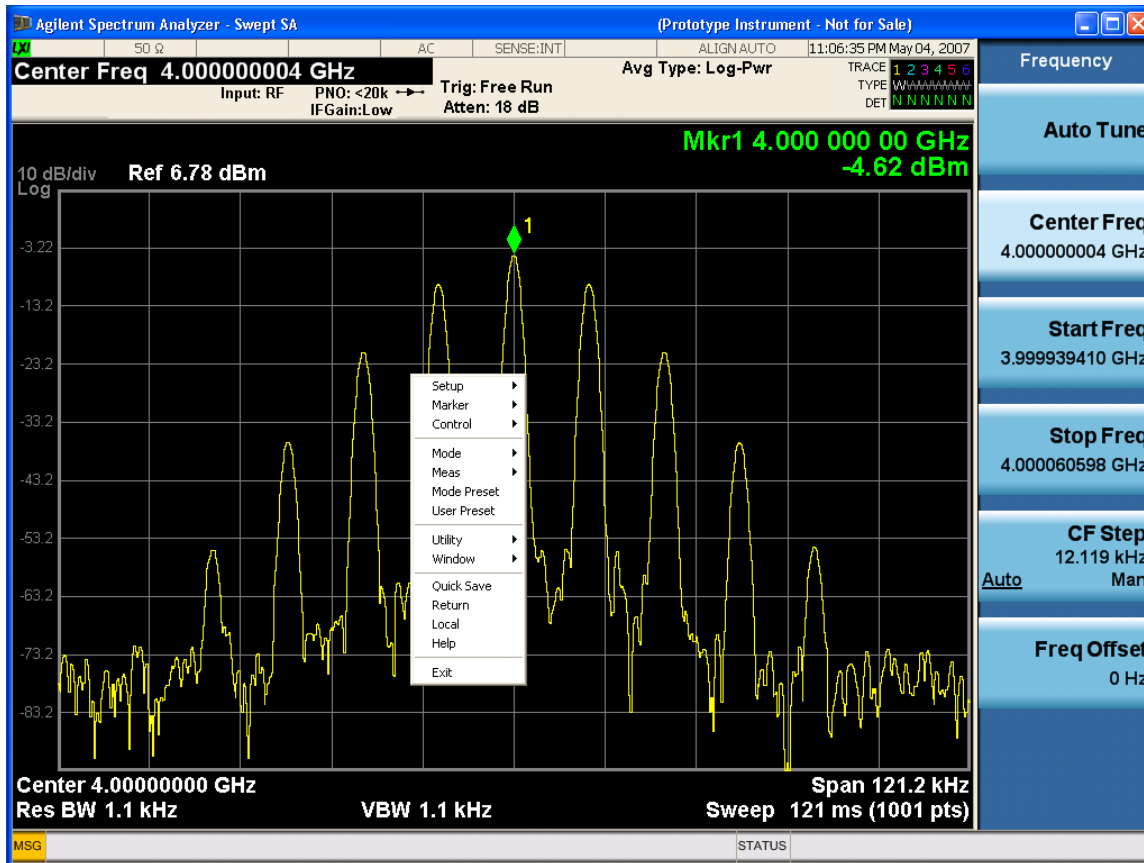
The window navigation does NOT use the arrow and select keys. Those are reserved for navigation within a window.

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.

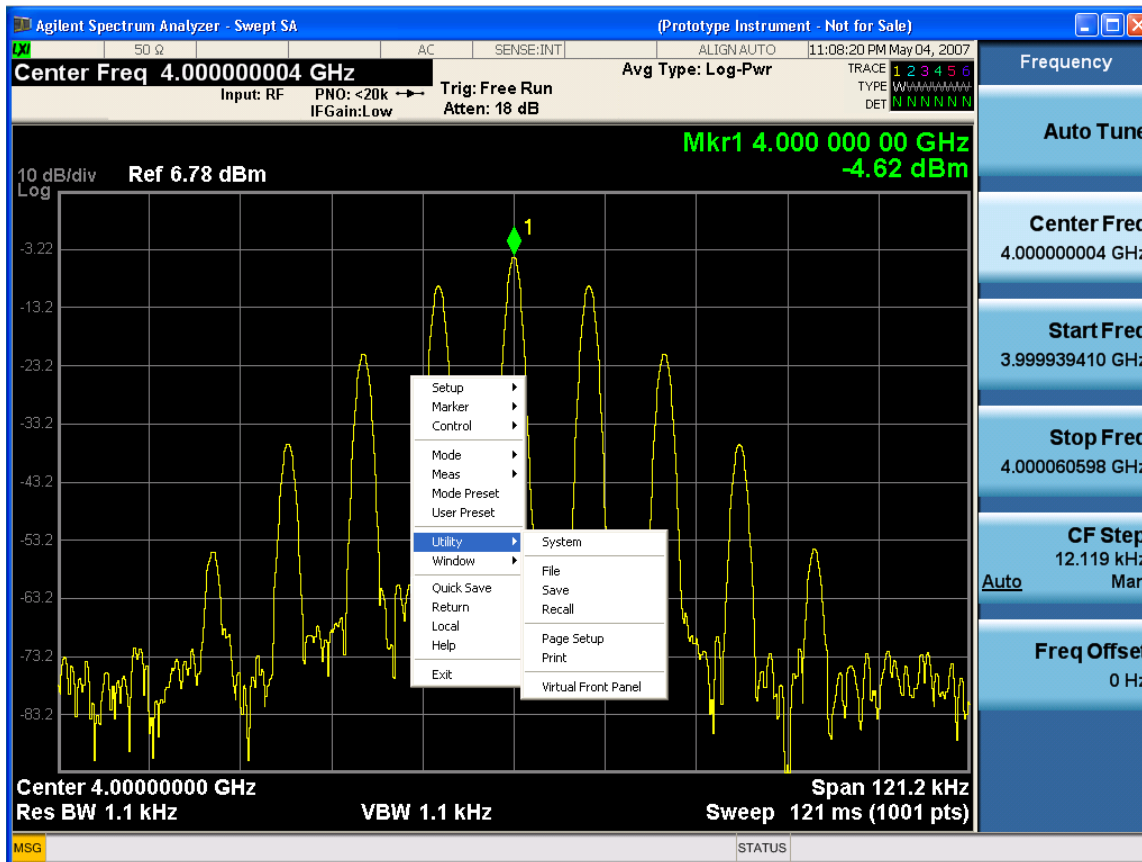
Right-Click

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



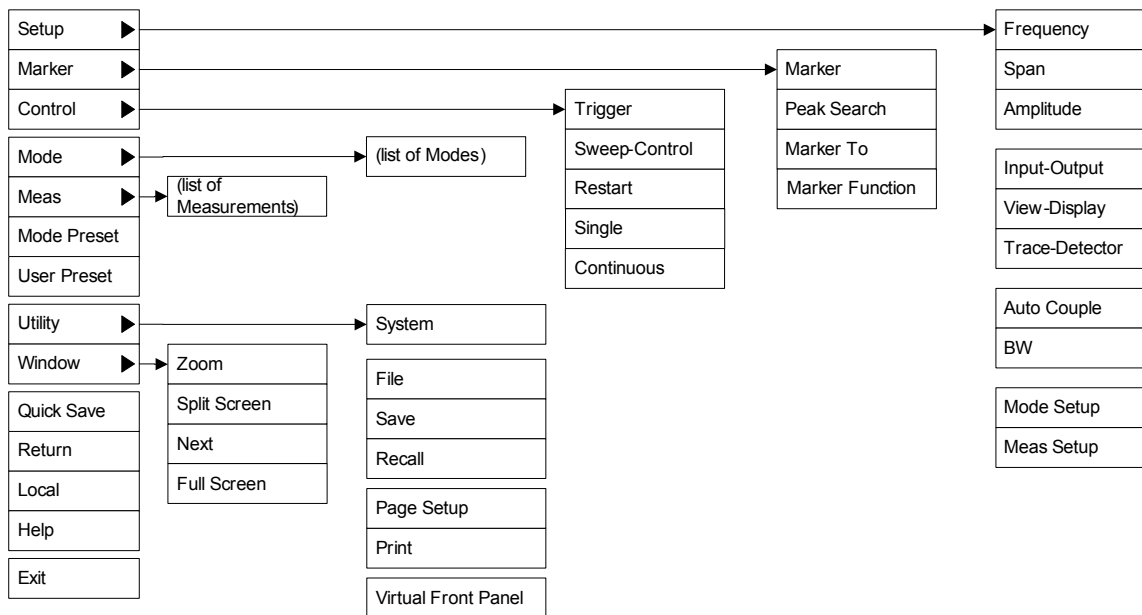
Placing the mouse on one of the rows marked with a right arrow symbol causes that row to expand, as for example below where the mouse is hovered over the “Utility” row:

About the Analyzer Mouse and Keyboard Control



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	Shortcut
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+SHIFT+E
Marker	CTRL+SHIFT+K
Peak Search	CTRL+SHIFT+P
Marker To	CTRL+ALT+N
Marker Function	CTRL+ALT+F
System	CTRL+SHIFT+Y
QuickSave	CTRL+SHIFT+Q
Save	CTRL+S
Recall	CTRL+R
Mode Preset	CTRL+M
User Preset	CTRL+U
Print	CTRL+P
File	CTRL+F
Mode	CTRL+SHIFT+M
Measure	CTRL+ALT+M
Mode Setup	CTRL+ALT+E
Meas Setup	CTRL+ALT+U
Trigger	CTRL+SHIFT+T
Sweep/Control	CTRL+SHIFT+W

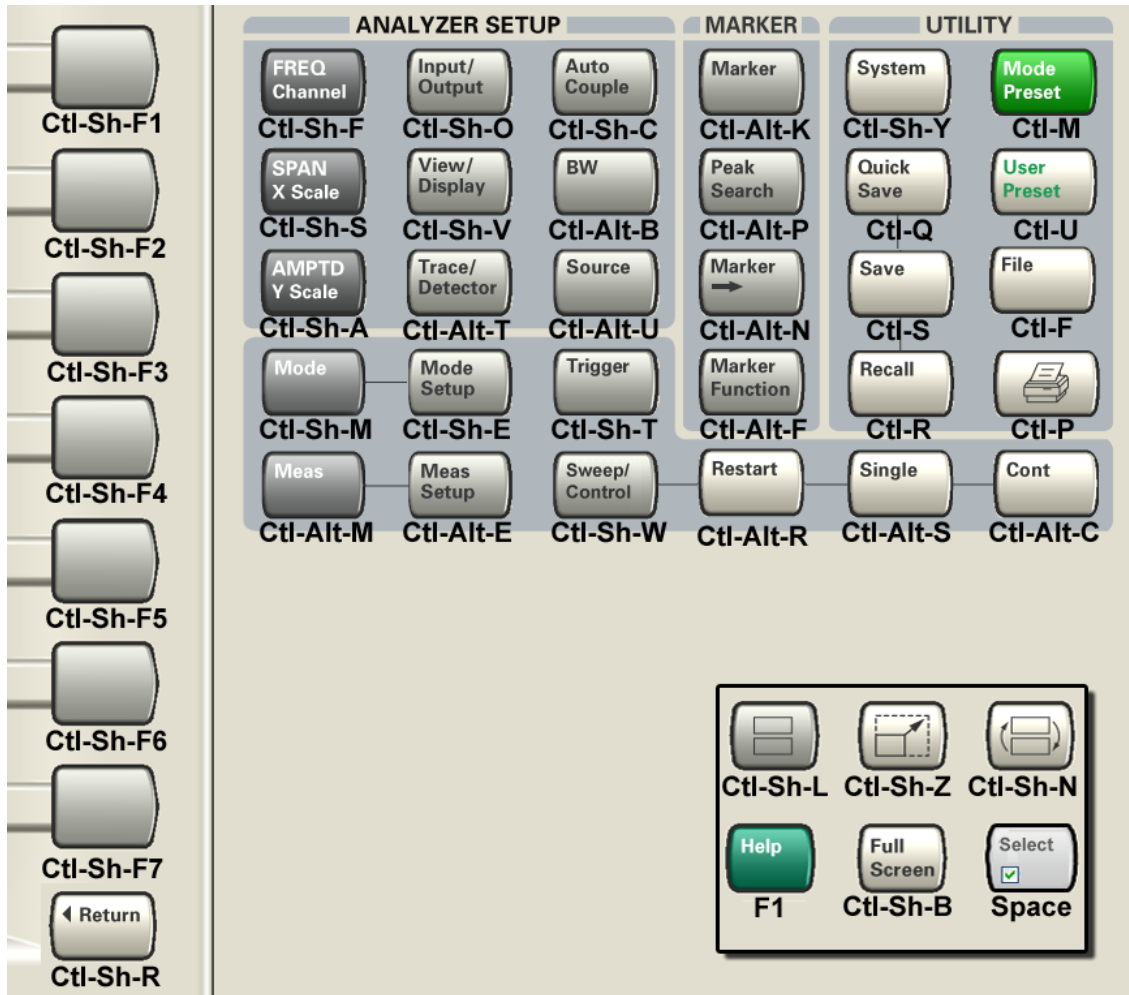
About the Analyzer
Mouse and Keyboard Control

Front-Panel Key	Shortcut
Restart	CTRL+ALT+R
Single	CTRL+ALT+S
Cont	CTRL+ALT+C
Zoom	CTRL+SHIFT+Z
NextWindow	CTRL+SHIFT+N
SplitScreen	CTRL+SHIFT+L
FullScreen	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 key1	CTRL+SHIFT+F1
Menu key2	CTRL+SHIFT+F2
Menu key3	CTRL+SHIFT+F3
Menu key4	CTRL+SHIFT+F4
Menu key5	CTRL+SHIFT+F5
Menu key6	CTRL+SHIFT+F6
Menu key7	CTRL+SHIFT+F7

Front-Panel Key	Shortcut
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

Here is a pictorial view of the table above:

About the Analyzer
 Mouse and Keyboard Control



3

About the N9080A LTE Measurement Application

This chapter provides overall information on the Agilent N9080A LTE Measurement Application and describes the measurements made by the analyzer. Installation instructions for adding this option to your analyzer are provided in this section, in case you purchased this option separately.

What Does the Agilent N9080A LTE Measurement Application Do?

The N9080A LTE is a full-featured LTE signal analyzer that can help determine if an modulated source or transmitter is working correctly. There are standard and optional settings to enable complete analysis of LTE communications signals.

The N9080A 1FP LTE measurement application provides:

- Uplink (SC-FDMA), downlink (OFDMA), and Tx Diversity, MIMO analysis
- All LTE bandwidths: 1.4 MHz to 20 MHz
- All LTE modulation formats and sequences: BPSK, QPSK, 16QAM, 64QAM, CAZAC (Zadoff-Chu) Both downlink (OFDMA) and uplink (SC-FDMA) analysis
- Support for all LTE uplink channels and signals: PUSCH DM-RS, PUSCH, PUCCH DM-RS, and PUCCH
- Support for all LTE downlink channels and signals: RS, P-SS, S-SS, P-BCH, PDCCH, PCFICH, PHICH, and PDSCH
- View signal by: resource block, sub-carrier, slot, or symbol—select all or specific region for analysis. 2D graphical interface shows pictorial representation of user allocation
- Flexible display: Up to four simultaneous user-controllable trace displays
- Flexible markers: Up to 12 markers that can be coupled across different measurements
- X-Series front-panel operation with SCPI programmability
- Compatibility with all X-Series (MXA/EXA) signal analyzers
- Monitor Spectrum measurement for viewing signal spectrum

The N9080A 1FP LTE measurement application supports the following standards:

- 3GPP TS 36.101 V8.1.0 (2008-03)
- 3GPP TS 36.104 V8.1.0 (2008-03)
- 3GPP TS 36.211 V8.2.0 (2008-03)
- 3GPP TS 36.212 V8.2.0 (2008-03)
- 3GPP TS 36.213 V8.2.0 (2008-03)

Installing Application Software

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

So when you purchase an application, you will receive an entitlement certificate that is used to obtain a license key for that particular measurement application. Enter the license key that you obtain into the N9020A Signal Analyzer to activate the new measurement application. See below for more information.

For the latest information on Agilent Signal Analyzer measurement applications and upgrade kits, visit the following internet URL.

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

Viewing a License Key

Measurement personalities 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 which measurement applications are currently licensed in your analyzer.

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

C:\Programing Files\Agilent\Licensing

NOTE	You may want to keep a copy of your license key in a secure location. You can print out a copy of the display showing the license numbers to do this. If you should lose your license key, call your nearest Agilent Technologies service or sales office for assistance.
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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. Follow the instructions that accompany the certificate to obtain your license key.

Installing a license key for the selected application can be done automatically using a USB memory device. To do this, you would put the license file on 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 license management application in the instrument. It is found through the instrument front panel keys at **System, Licensing. . .**, or internally at C:\Programming Files\Agilent\Licensing.

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

Missing and Old 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 assures that you get any improvements and expanded functionality that is available.

Because the software was loaded at the initial purchase, there may be additional measurement applications that are now available. If the application you are interested in licensing is not available, you will need to do a software update. (Press **System**, **Show**, **System**.)

Check the Agilent internet website for the latest software versions available for downloading:

http://www.agilent.com/find/mxa_software
http://www.agilent.com/find/exa_software

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

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

What Programming Information is Available?

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

- X-Series Programmer's Guide (N9020-90084):
 - Chapter 1 , "Introduction to Programming X-Series Applications"
The Introduction includes sections on the following:
 - What Programming Information is Available? (Similar to this section.)
 - Using Embedded Help for Programming
 - Communicating SCPI Using Telnet
 - Chapter 2 , "Programming Fundamentals"
Programming Fundamentals includes sections on the following:
 - SCPI Language Basics
 - Improving Measurement Speed
 - Programming in C Using the VTL
 - Chapter 3 , "Measurement Synchronization with LXI-B"
 - Chapter 5 , "Installing Application Software"
 - Chapter 4 , "Programming Examples"
- Getting Started Guide (N9020-90074):

A copy of the Getting Started Guide is shipped with your analyzer, and is also available online: <http://cp.literature.agilent.com/litweb/pdf/N9020-90074.pdf>

The Getting Started Guide has valuable sections related to programming including:

 - Configuring instrument LAN Hostname, IP Address, and Gateway
 - Using the Remote Desktop connection to operate the instrument front panel remotely
 - Using the Embedded Web Server Telnet connection to communicate SCPI
- Embedded Help in your Instrument - embedded Help provides SCPI command details associated with all front-panel and soft keys.
- User's Reference manuals - Printable PDF versions of User's References for all Measurement Applications are provided on the Documentation CD ROM, and in the instrument here:

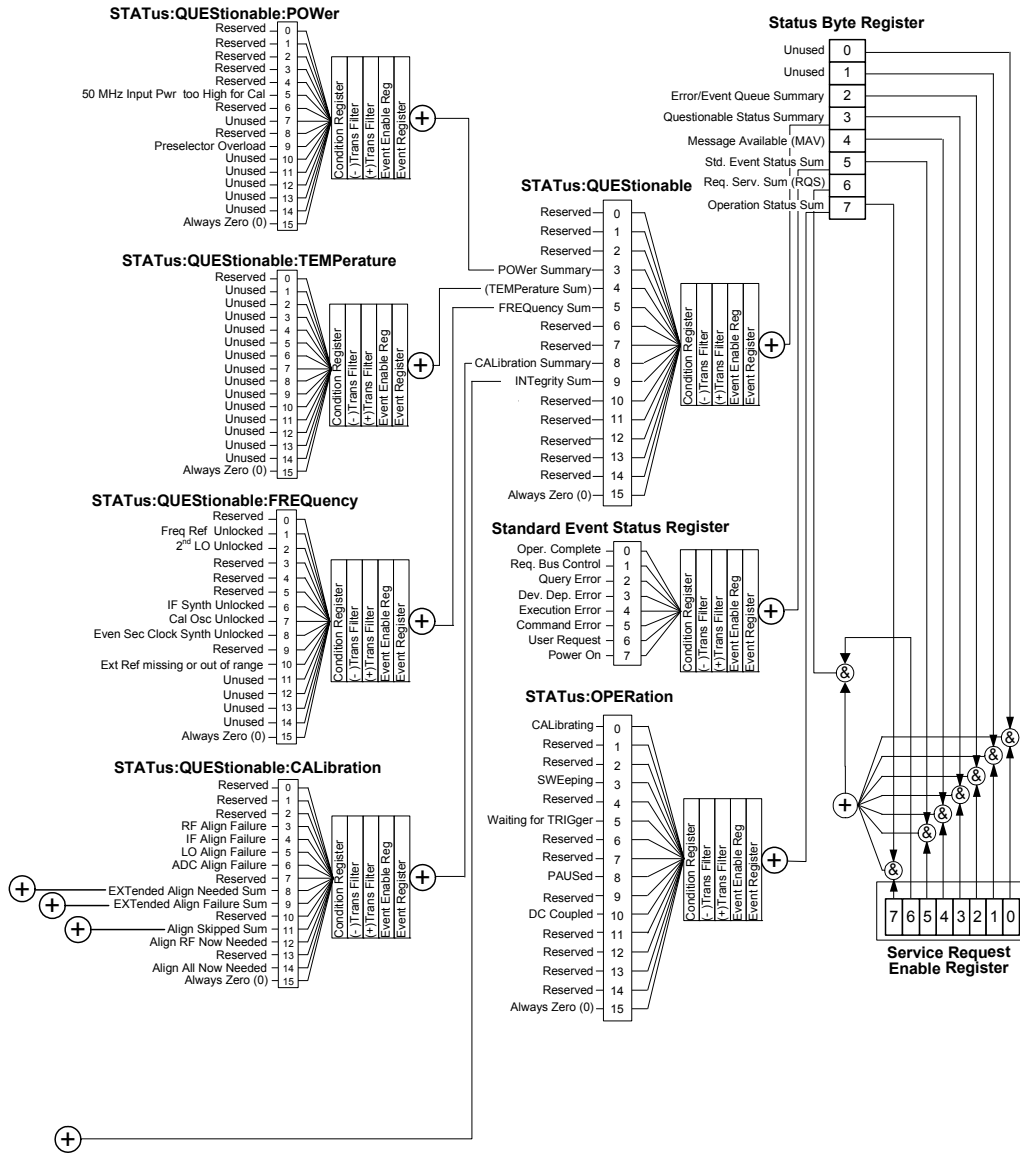
C:\Program Files\Agilent\SignalAnalysis\Infrastructure\Help\bookfiles
- Application Notes- Printable PDF versions of many Application Notes are provided on the Documentation CD ROM, and in the instrument here:

C:\Program Files\Agilent\SignalAnalysis\Infrastructure\Help\otherdocs

STATUS Subsystem (No equivalent front panel keys)

The following graphics show the current MXA Status Register Subsystem implementation.

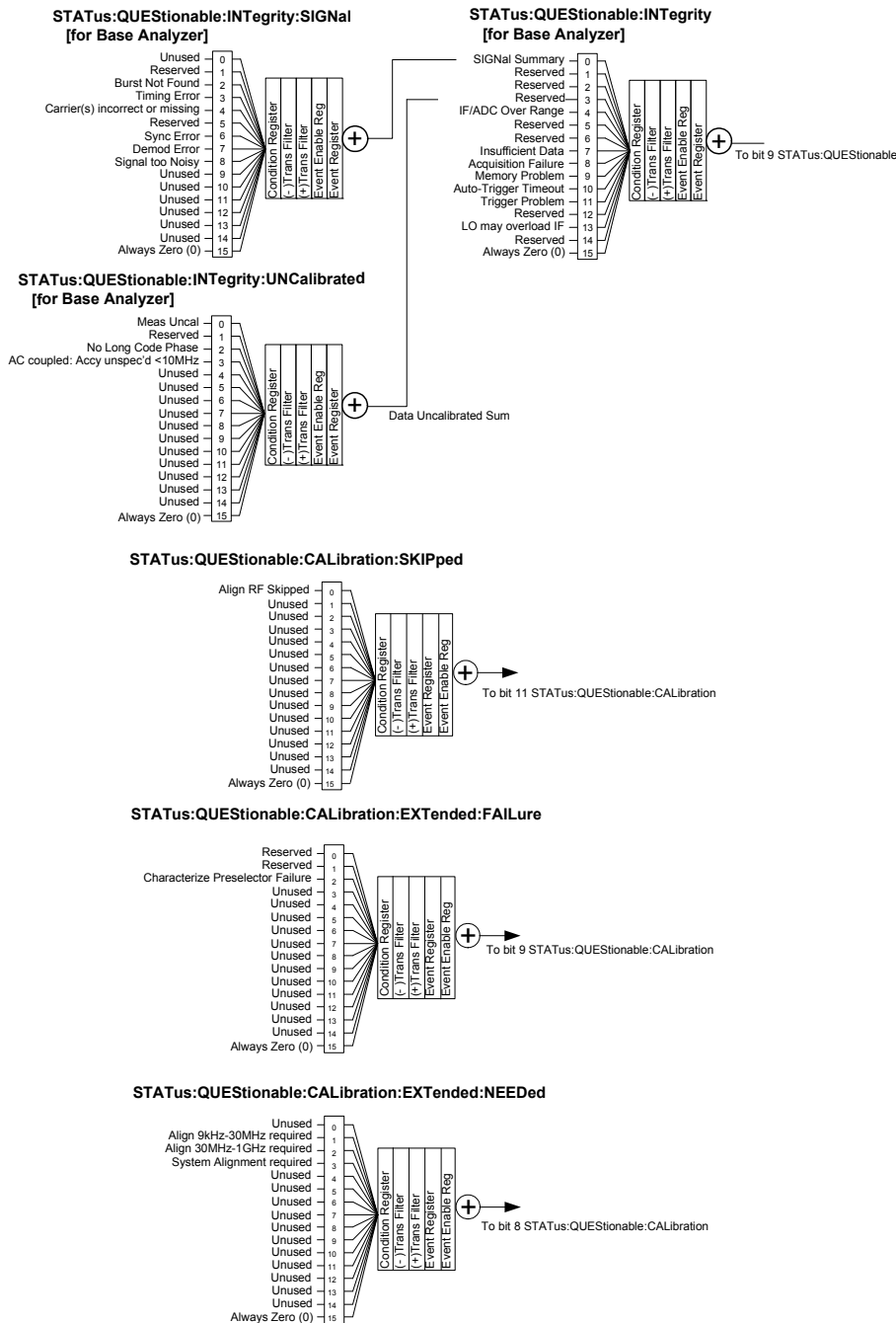
MXA Status Byte Register System



Programming the Analyzer

STATUS Subsystem (No equivalent front panel keys)

Additional Registers:



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.

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.

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:

1. Determine which register contains the bit that reports the condition.
2. Send the unique SCPI query that reads that register.
3. 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).

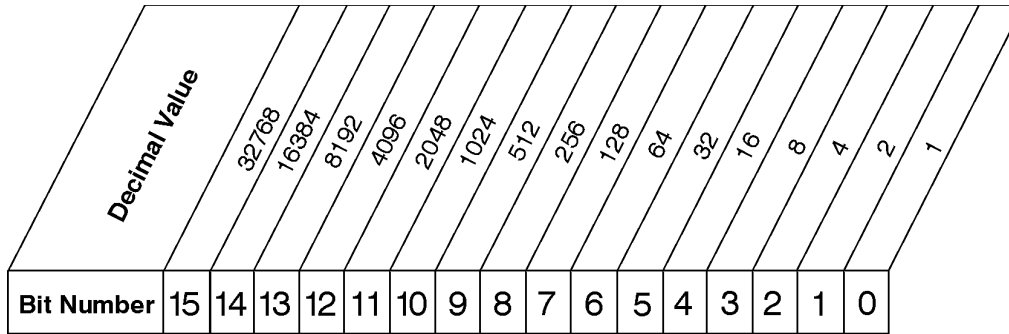
You can enable a particular bit(s), using the event enable register. The instrument will then monitor that particular condition(s). If the bit becomes true (0 to 1 transition) in the event register, it stays set until the event register is cleared. Querying the event register allows you to detect that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



STATus:OPERation:ENABle <num>
 STATus:OPERation:ENABle?

Standard Operation Event Enable Register

ck730a

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 comes 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 whose 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.

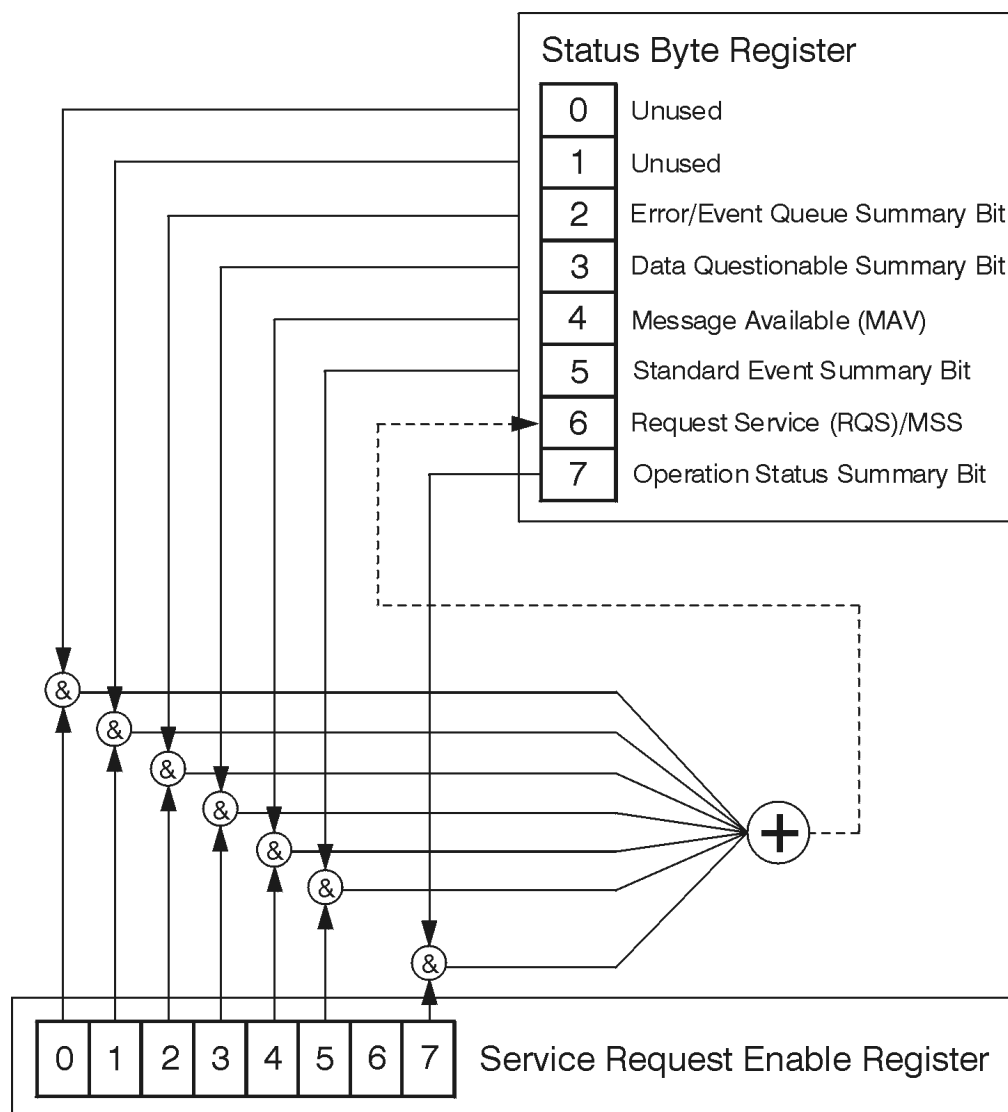
If the status register is configured to SRQ on end-of-measurement and the measurement is in continuous mode, then restarting a measurement (INIT command) can cause the measuring bit to pulse low. This causes an SRQ when you have not actually reached the "end-of-measurement" condition. To avoid this:

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



ck776a

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.

Description									
	Standard Operation Status Summary Bit	Request Service (RQS) Summary Bit	Standard Event Status Summary Bit	Message Available (MAV)	Data Questionable Status Summary Bit	Error/Event Queue Summary Bit	Unused	Unused	
Bit Number	7	6	5	4	3	2	1	0	

*STB?

Status Byte Register

ck725a

- | 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. |

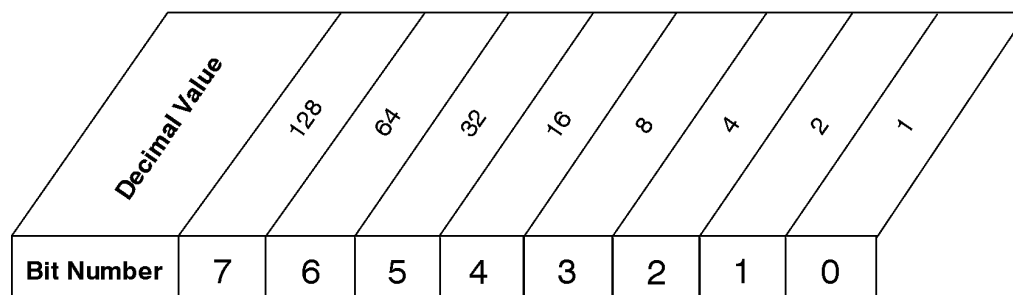
To query the status byte register, send the command *STB?. The response is the weighted decimal sum of the bits that are set to 1. For example, if bit number 7 and bit number 3 are set to 1, the weighted decimal sum of the 2 bits is 128 plus 8. So the decimal value 136 is returned. The *STB command does 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).

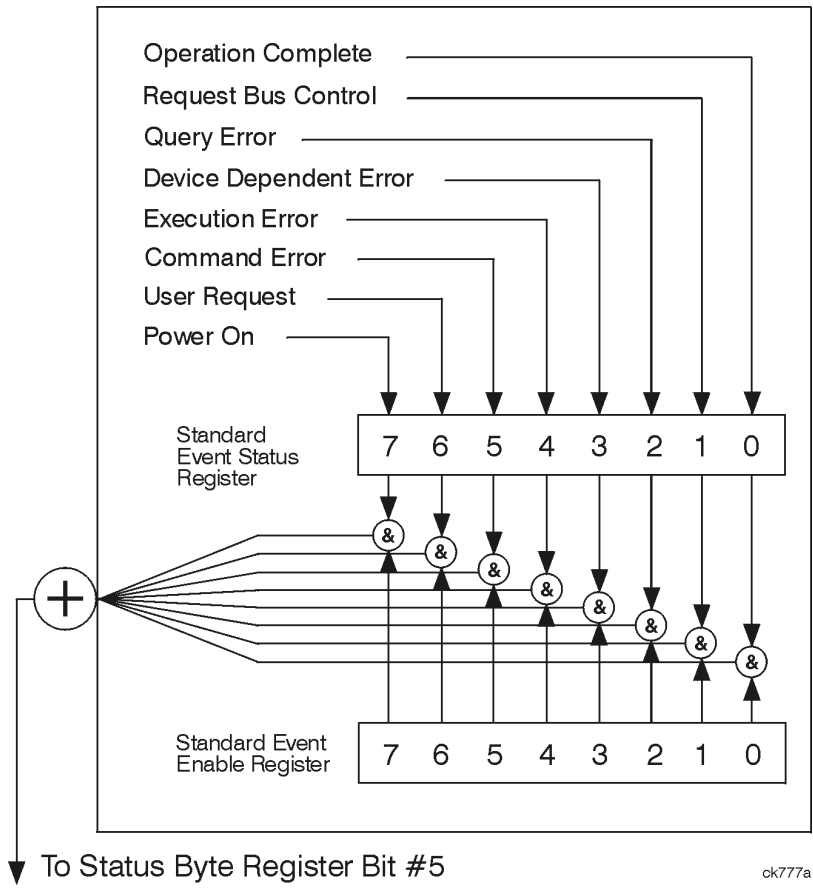


`*SRE <num>`
`*SRE?`

Service Request Enable Register

ck726a

Standard Event Status Register



The standard event status register contains the following bits:

Bit Number	7	6	5	4	3	2	1	0
Description	Power On	Reserved	Command Error	Execution Error	Device Dependent Error	Query Error	Request Control	Operation Complete

*ESR?

Standard Event Status Register

ck727a

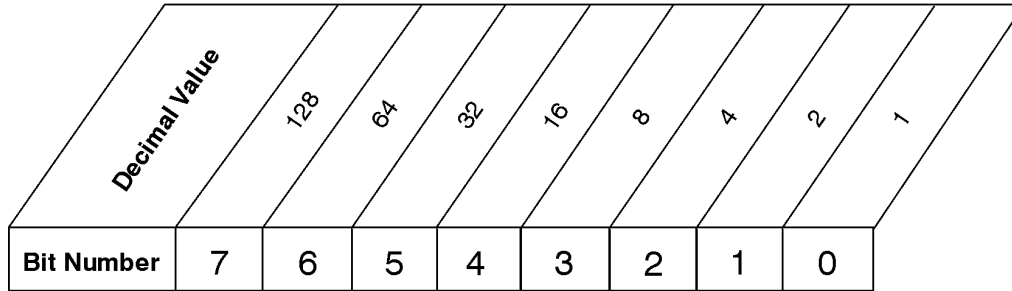
Bit Description

- 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 is the weighted decimal sum of the bits which are enabled (set to 1). For example, if bit number 7 and bit number 3 are enabled, the weighted 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).



*ESE <num>
*ESE?

Standard Event Status Enable Register

ck728a

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

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 currently only valid for Modes: ESA/PSA: Spectrum Analysis, Phase Noise, and ESA: Bluetooth, cdmaOne, GSM
5	Waiting for trigger	The instrument is waiting for the trigger conditions to be met, then it will trigger a sweep or measurement.
8	Paused	The instrument is paused (waiting) because you have pressed the Pause Meas Control key or send the INITiate:PAUSE command. Bit is currently only valid for Modes: ESA/PSA: Spectrum Analysis, Phase Noise, and ESA: Bluetooth, cdmaOne, GSM

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

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
SCPI Status Bits/OPC	Sequential command
Dependencies	

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.

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.

R&D: There is little reason to have any bits enabled for typical manufacturing tests. Enabling bits in this register would be of more value during test development.

Mode	All
Remote Command	:STATus:OPERation:ENABle <integer> :STATus:OPERation:ENABle?
Example	STAT:OPER:ENAB 1 Sets the register so that Align Now operation is reported to the Status Byte Register.
Preset	0
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

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

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
SCPI Status Bits/OPC Dependencies	Sequential command

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 is reported to the Status Byte Register.

Preset	0
Min	0
Max	32767
SCPI Status Bits/OPC	Sequential command
Dependencies	

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 is reported to the Status Byte Register.
Preset	32767
Min	0
Max	32767
SCPI Status Bits/OPC	Sequential command
Dependencies	

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

Questionable Register

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

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
SCPI Status Bits/OPC Dependencies	Sequential command

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.

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
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Remote Command	:STATus:QUEStionable:ENABle 16 Sets the register so that temperature summary is reported to the Status Byte Register :STATus:QUEStionable:ENABle?
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Example	STAT:OPER:PTR 1 Align Now operation beginning is reported to the Status Byte Register.
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Preset	0
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Min	0
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Max	32767
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SCPI Status Bits/OPC Dependencies	Sequential command
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Questionable Event Query This query returns the decimal value of the sum of the bits in the Questionable Event register.

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
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Remote Command	:STATus:QUEStionable[:EVENT]?
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Example	STAT:QUES?
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Preset	0
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SCPI Status Bits/OPC Dependencies	Sequential command
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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 16 Temperature summary 'questionable cleared' will be reported to the Status Byte Register. :STATus:QUEStionable:NTRansition?
Example	STAT:QUES:NTR 16 Temperature summary 'questionable cleared' is reported to the Status Byte Register.
Preset	0
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

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
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Calibration Register

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

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

Mode	All
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Remote Command :STATus:QUESTionable:CALibration:CONDition?
 Example STAT:QUES:CAL:COND?
 Preset 0
 SCPI Status Bits/OPC Sequential command
 Dependencies

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
 SCPI Status Bits/OPC Sequential command
 Dependencies

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
 SCPI Status Bits/OPC Sequential command
 Dependencies

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
SCPI Status Bits/OPC Dependencies	Sequential command

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
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Calibration Skipped Register

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
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Remote Command	:STATus:QUESTionable:CALibration:SKIPped:CONDition?
Example	STAT:QUES:CAL:SKIP:COND?
Preset	0
SCPI Status Bits/OPC	Sequential command
Dependencies	

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
SCPI Status Bits/OPC	Sequential command
Dependencies	

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
SCPI Status Bits/OPC	Sequential command
Dependencies	

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
SCPI Status Bits/OPC Dependencies	Sequential command

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
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Calibration Extended Failure Register

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

SCPI Sequential command

Status Bits/OPC Dependencies

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

SCPI Status Bits/OPC Dependencies Sequential command

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
SCPI Status Bits/OPC	Sequential command
Dependencies	

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
SCPI Status Bits/OPC	Sequential command
Dependencies	

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
SCPI Status	Sequential command
Bits/OPC	
Dependencies	

Questionable Calibration Extended Needed Register

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
SCPI Status	Sequential command
Bits/OPC	
Dependencies	

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

SCPI Status Bits/OPC Sequential command
 Dependencies

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

SCPI Status Sequential command
 Bits/OPC
 Dependencies

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

SCPI Status Sequential command
 Bits/OPC
 Dependencies

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
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Frequency Register

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
SCPI Status Bits/OPC Dependencies	Sequential command

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 is reported to the Frequency Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

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
SCPI Status Bits/OPC Dependencies	Sequential command

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
 SCPI Status Bits/OPC Sequential command
 Dependencies

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
 SCPI Status Bits/OPC Sequential command
 Dependencies

Questionable Integrity Register

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
 SCPI Status Bits/OPC Sequential command
 Dependencies

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
SCPI Status Bits/OPC Dependencies	Sequential command

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
SCPI Status Bits/OPC Dependencies	Sequential command

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
SCPI Status Bits/OPC Dependencies	Sequential command

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
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Integrity Signal Register

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

SCPI Status Bits/OPC Sequential command
 Dependencies

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

SCPI Status Bits/OPC Sequential command
 Dependencies

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
 SCPI Status Bits/OPC Sequential command
 Dependencies

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
SCPI Status Bits/OPC Dependencies	Sequential command

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
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Integrity Uncalibrated Register

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
SCPI Status Bits/OPC	Sequential command
Dependencies	

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
SCPI Status Bits/OPC	Sequential command
Dependencies	

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
SCPI Status Bits/OPC Dependencies	Sequential command

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
SCPI Status Bits/OPC Dependencies	Sequential command

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

SCPI Status Bits/OPC Sequential command
 Dependencies

Questionable Power Register

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

SCPI Status Bits/OPC Sequential command
 Dependencies

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

SCPI Status Bits/OPC Sequential command
 Dependencies

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
SCPI Status Bits/OPC Dependencies	Sequential command

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
SCPI Status Bits/OPC Dependencies	Sequential command

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
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Temperature Register

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
SCPI Status Bits/OPC Dependencies	Sequential command

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
SCPI Status Bits/OPC Dependencies	Sequential command

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
SCPI Status Bits/OPC Dependencies	Sequential command

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
SCPI Status Bits/OPC Dependencies	Sequential command

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	<code>:STATus:QUEStionable:TEMPerature:PTRansition</code> <integer> <code>:STATus:QUEStionable:TEMPerature:PTRansition?</code>
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
SCPI Status Bits/OPC Dependencies	Sequential command

IEEE Common GPIB Commands

Numeric values for bit patterns can be entered using decimal or hexadecimal representations. (i.e. 0 to 32767 is equivalent to #H0 to #H7FFF).

Calibration Query

*CAL? Performs a full alignment and returns a number indicating the success of the alignment. A zero is returned if the alignment is successful. A one is returned if any part of the alignment fails. The equivalent SCPI command is CALibrate[:ALL]?

See the Section “Alignments” on page 193 for details of *CAL?.

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.

Remote Command	*CLS
Example	*CLS Clears the error queue and the Status Byte Register.
Remote Command Notes	For related commands, see the SYSTem:ERRor[:NEXT]? command. See also the STATus:PRESet command and all commands in the STATus subsystem.
Key Path	No equivalent key. Related key System, Show Errors, Clear Error Queue
SCPI Status Bits/OPC Dependencies	Resets all bits in all event registers to 0, which resets all the status byte register bits to 0 also.

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.

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.
Remote Command 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
Key Path	No equivalent key. Related key System, Show Errors, Clear Error Queue
SCPI Status Bits/OPC Dependencies	Event Enable Register of the Standard Event Status Register.

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.
SCPI Status Bits/OPC Dependencies	Standard Event Status Register (bits 0 – 7).
Remote Command Notes	For related commands, see the STATus subsystem commands.
Preset	0
Min	0
Max	255

Identification Query

Returns a string of instrument identification information. The string contains 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

Remote Command	*IDN?
Example	*IDN? Returns instrument identification information, such as: Agilent Technologies,N9020A,US01020004,A.01.02
Key Path	No equivalent key. See related key: System, Show System.

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.
SCPI 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.

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”.

Remote Command	*OPT?
-----------------------	-------

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 is loaded.
- If the state being loaded has an older firmware revision than the revision of the instrument, the instrument only loads 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.
Restriction and Notes	Registers 0 through 6 are accessible from the front panel in menu keys for Recall Registers.
SCPI Status Bits/OPC Dependencies	The command is sequential.
Min	0
Max	127

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.
Restriction and Notes	Registers 0 through 6 are accessible from the front panel in menu keys for Save Registers.
SCPI Status Bits/OPC Dependencies	The command is sequential.
Min	0
Max	127

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.
SCPI Status Bits/OPC Dependencies	Service Request Enable Register (all bits, 0 – 7).
Remote Command Notes	For related commands, see the STATus subsystem and SYSTem:ERRor[:NEXT]? commands.
Preset	255
Min	0
Max	255

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.
SCPI Status Bits/OPC Dependencies	Status Byte Register (all bits, 0 – 7).
Remote Command Notes	See related command *CLS, in the Section “Clear Status” on page 165 .

Trigger

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

Remote Command	*TRG
Example	*TRG Triggers the instrument to take a sweep or start a measurement, depending on the current instrument settings.
Remote Command Notes	See related command :INITiate:IMMediate, in the Section “Restart” on page 879 .
Key Path	No equivalent key. See related keys Single and Restart .

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.

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.

SCPI Status Bits/OPC Not global to all remote ports or front panel. *OPC only
Dependencies considers operation that was initiated on the same port as
the *OPC command was issued from.

File

Opens a menu of keys which access various standard and custom Windows dialogs. Pressing any other front-panel key exits any of these dialogs.

Instrument S/W Revision A.01.60 or later

File Explorer

Opens the standard Windows File Explorer. Pressing any front-panel key closes the Explorer application.

File Explorer opens up in My Documents.

Instrument S/W Revision A.01.60 or later

Page Setup

Refer to your Microsoft Windows Operating System manual.

Instrument S/W Revision A.01.60 or later

Print Theme – Remote Command

The graphical user interface contains a selection for choosing the Theme to use when printing. An equivalent remote command is provided. Refer to the View/Display section for more detail on Themes.

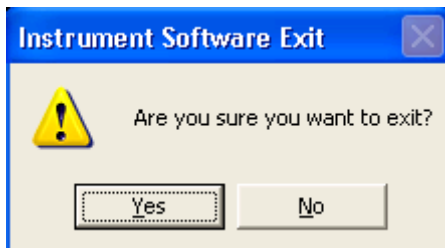
Mode	All
Remote Command	:SYSTem:PRINT:THEME TDCOLOR TDMonochrome FCOLOR FMONochrome :SYSTem:PRINT:THEME?
Preset	FCOL; not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes
State Saved	No
Example	:SYST:PRIN:THEM FCOL
Instrument S/W Revision	A.01.60 or later

Print

Refer to your Microsoft Windows Operating System manual.

Exit

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



Key Path	File, Exit
Mode	All
Instrument S/W Revision	A.01.60 or later

Preset

Mode Preset

The Mode preset is the most common way to get the active mode back to a known state. It will keep you in the currently active mode and reset the mode settings to their mode preset state. It will never cause a mode switch. It does a partial preset. It does not affect any mode persistent settings or any system settings.

The **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 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.

Key Path	Front-panel key
Remote Command	:SYSTem:PRESet
Dependencies/Couplings	A Mode Preset will cause the currently running measurement to be aborted and cause the default measurement to be active. Mode Preset gets the mode to a consistent state with all of the default couplings set.
Restriction and Notes	Clears all pending OPC bits. The Status Byte is set to 0.
Remote Command 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.
Example	:SYST:PRES
Instrument S/W Revision	A.01.60 or later

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front panel access. Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurement 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.

The Auto Couple front-panel key is a Meas local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to the other measurements in the mode will not be affected by Auto Couple.

The Meas Preset key is a Meas local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

The Mode Preset (front-panel key on front panel) resets all the current mode's Meas local and Meas global variables except the persistent ones.

The Restore Mode Defaults key 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

Restore Mode Defaults

Restore Mode Defaults resets the state for the currently active mode by resetting the mode persistent settings to their factory default values, clearing mode data and by performing a Mode Preset. This function will never cause a mode switch. This function performs a full preset for the currently active mode; whereas, Mode Preset performs a partial preset. Restore Mode Defaults does not affect any system settings. System settings are reset by Restore System Defaults. This function does reset mode data; as well as settings.

Key Path	Mode Setup
Remote Command	:INSTrument:DEFault
Dependencies/Couplings	A Restore Mode Defaults will cause the currently running measurement to be aborted and causes the default measurement to be active. It gets the mode to a consistent state with all of the default couplings set.
Restriction and Notes	A pop-up message comes up saying: "If you are sure, press key again".
Remote Command Notes	Clears all pending OPC bits. The Status Byte is set to 0.
Example	:INST:DEF
Instrument S/W Revision	A.01.60 or later

*RST (Remote Command Only)

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

Remote Command:	*RST
Dependencies/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.
Restriction and Notes:	Clears all pending OPC bits and the Status Byte is set to 0.
Remote Command Notes:	Sequential
Example:	*RST
Instrument S/W Revision:	A.01.60 or later

Print

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

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Quick Save

The Quick Save front-panel key repeats the most recent save which was performed from the Save menu, with some qualification:

Quick Save pays no attention to register saves. Register saves are not remembered as Saves for the purpose of Quick Save

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 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. For details on the suffix for each file type, see the documentation for the Save front-panel key. 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 works its way up 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. This is because the whole point of Auto File Name is to relieve the user from having to pick a file name. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes; i.e. 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, we advance the counter to State_0011.state to ensure that no conflict will exist (and then we verify that State_0011.state also doesn't exist in the current directory and advance again if it does, et cetera).

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 Meas Results file as "fred.csv", then the next auto file name chosen for a Meas 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 the user had not entered their own file name.

 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	Quick Save
Remote Command Notes	No remote command for this key specifically.
Instrument S/W Revision	A.01.60 or later

Recall

Operation of this key is identical across several measurements. For details about this key, see [Recall@2637@i](#).

Save

Operation of this key is identical across several measurements. For details about this key, see [Save@2600@i](#).

System

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

Key Path	Front-panel key
Remote Command Notes	No remote command for this key specifically.
Instrument S/W Revision	A.01.60 or later

Show

Opens 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 :SYSTem:SHOW?
Preset	OFF
State Saved	No
Range	OFF ERRor SYSTem HARDware LXI HWSTatistics ALIGNment SOFTware
Remote Command Notes	This command displays (or exits) the various System information screens.
Example	:SYST:SHOW SYST
Instrument S/W Revision	A.01.60 or later

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 button 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 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. In other words, 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.

Remote Command	:SYSTem:ERRor[:NEXT]?
Restriction and Notes	The return string has the format: “<Error Number>,<Error>” Where <Error Number> and <Error> are defined in the Master Error Messages document.
Example	:SYST:ERR?
Key Path	System, Show
Mode	All
State Saved	No
Instrument S/W Revision	A.01.60 or later

Next Page Next Page and Previous Page menu keys move the user 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, Show Errors
Instrument S/W Revision	A.01.60 or later

Previous Page See [“Next Page” on page 183](#).

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

status items.

Key Path	System, Show, Show Errors
Instrument S/W Revision	A.01.60 or later

Status See “History” on page 183.

Verbose SCPI On/Off This is a capability that will allow the SCPI data stream to be displayed when a SCPI error is detected, showing the characters which stimulated the error and several of the characters preceding the error.

Remote Command	:SYSTem:ERRor:VERBoSe OFF ON 0 1 :SYSTem:ERRor:VERBoSe?
Example	:SYST:ERR:VERB ON
Key Path	System, Show, Show Errors
Mode	All
Preset	This is unaffected by Preset but is set to OFF on a “Restore System Defaults->Misc”
State Saved	No
Range	On Off
Instrument S/W Revision	A.01.60 or later

Refresh When pressed, refreshes the Show Errors display.

Key Path	System, Show, Show Errors
Instrument S/W Revision	A.01.60 or later

Clear Error Queue This clears all errors in all error queues.

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, Show Errors
Instrument S/W Revision	A.01.60 or later

System

The System screen is formatted into three groupings: product descriptive information,

options tied to the hardware, and software products:

```

<Product Name> <Product Description>
Product Number: N9020A
Serial Number: US46220924
Firmware Revision: A.01.01
Computer Name: <hostname>
Host ID: N9020A,US44220924

N9020A-503      Frequency Range to 3.6 GHz
N9020A-PFR     Precision Frequency Reference
N9020A-P03     Preamp 3.6 GHz

N9060A-2FP     Spectrum Analysis Measurement Suite  1.0.0.0
N9073A-1FP     WCDMA                               1.0.0.0
N9073A-2FP     WCDMA with HSDPA                       1.0.0.0

```

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.

Example	SYST:SHOW SYST
Key Path	System, Show
Mode	All
Instrument S/W Revision	A.01.60 or later

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:

System Functions System

Hardware Information

MXA Signal Analyzer
Product Number: N9020A
Serial Number: US46220107
Firmware Revision: A.01.14

Assembly Name	Part #	Serial #	Matl Rev	Rev	OF Rev	Hw Id	Misc
Analog IF	E441060104	78060200131	003	0	C	15	
YIG Tuned Filter	50877305	11061500550	005	0	A	11	
Digital IF	E441060105	78060100559	003	0	F	14	
Front End Controller	E441060101	78060100147	004	2	A	8	
Low Band Switch	E441060170	78060800346	005	1	A	10	
LO Synthesizer	E441060102	78060100226	003	3	G	2	
Reference	E441060108	78060300420	004	1	C	16	
Front End	E441060154	13062800820	010	2	B	9	

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 of information is presently displayed.

Example	SYST:SHOW HARD
Key Path	System, Show
Mode	All
Instrument S/W Revision	A.01.60 or later

LXI

This key shows you the product number, serial number, firmware revision, computer name, IP address, Host ID, LXI Class, LXI Version, MAC Address, and the Auto-MDIX Capability.

TIP For information about setting up measurements using LXI, refer to the "Programmer's Guide" located in your analyzer at: C:/Program Files/Agilent/Signal Analysis/Help/Bookfiles/x_series_prog.pdf. It is also available by selecting the "Additional Documentation" page of the

Help.

Key Path	System, Show
Instrument S/W Revision	A.01.60 or later

LXI Event Log The event log records all of the LXI LAN event activity. As LXI LAN events are sent or received, the activity is noted in the Event Log with an IEEE 1588 timestamp. When the event log is selected, the current contents of the event log are displayed in the system information screen.

The fields recorded in the Event Log are:

- The date the event occurred (GMT)
- The time the event occurred (GMT)
- The type of event: LAN Input, LAN Output, Status, Alarm, Trigger Alarm, Trigger LAN
- The name of the event
- The edge associated with the event
- The event's identifier: This is the string that appears on the LAN.
- The source event: This is only valid for LAN Output, Trigger LAN, and Trigger Alarm event types.
- The source address: This is only valid for LAN Input event types. It is the address from which the message originated.
- The destination address: This is only valid for LAN Output event types. It is the address (or addresses) that the message will be sent to. For UDP messages, this field reads "ALL."

Key Path	System, Show, LXI
Instrument S/W Revision	A.01.60 or later

Circular Sets the behavior for entries that occur while the LXI Event Log is full.

- If Circular is set to 1, incoming events overwrite the oldest events in the log.
- If Circular is set to 0, incoming events are discarded.

Key Path	System, Show, LXI, LXI Event Log
Remote Command	:LXI:EVENT:LOG:CIRCular[:ENABle] ON OFF 1 0 :LXI:EVENT:LOG:CIRCular[:ENABle]?
Example	:LXI:EVEN:LOG:CIRC 1
Preset	Not affected by a Preset. The default value of "ON" can be restored by pressing System, Restore Defaults, Misc.

State Saved	Saved in instrument state.
Range	OFF ON 0 1
Instrument S/W Revision	A.01.60 or later

Clear Clears the event log of all entries.

Key Path	System, Show, LXI, LXI Event Log
Remote Command	:LXI:EVENT:LOG:CLEAr
Example	:LXI:EVENT:LOG:CLE
Instrument S/W Revision	A.01.60 or later

Size Sets the maximum number of entries the LXI Event Log can hold.

Key Path	System, Show, LXI, LXI Event Log
Remote Command	:LXI:EVENT:LOG:SIZE <size> :LXI:EVENT:LOG:SIZE?
Example	:LXI:EVENT:LOG:SIZE 256
Preset	Not affected by a Preset. The default value of "64" can be restored by pressing System, Restore Defaults, Misc.
State Saved	Saved in instrument state.
Range	>= 0
Instrument S/W Revision	A.01.60 or later

Enabled Enables and disables the logging of LXI Events.

Key Path	System, Show, LXI, LXI Event Log
Remote Command	:LXI:EVENT:LOG:ENABle ON OFF 1 0 :LXI:EVENT:LOG:ENABle?
Example	:LXI:EVENT:LOG:ENAB ON
Preset	Not affected by a Preset. The default value of "ON" can be restored by pressing System, Restore Defaults, Misc.
State Saved	Saved in instrument state.
Range	ON OFF 0 1
Instrument S/W Revision	A.01.60 or later

Count (Remote Only) Returns the number of entries currently in the LXI Event Log.

Remote Command: : LXI : EVENT : LOG : COUNT ?
 Example: : LXI : EVEN : LOG : COUN ?
 Range: 0 – Size
 Instrument S/W Revision: A.01.60 or later

Next Entry (Remote Only) Returns the oldest entry from the LXI Event Log and removes it from the log. If the log is empty, an empty string is returned.

Remote Command: : LXI : EVENT : LOG [: NEXT] ?
 Example: : LXI : EVEN : LOG ?
 Instrument S/W Revision: A.01.60 or later

All (Remote Only) Non-destructively retrieves the entire contents of the event log. Entries are returned as separate strings, surrounded by double quote marks, and separated by a comma. Fields within each entry are also comma delimited.

Remote Command: : LXI : EVENT : LOG : ALL ?
 Example: : LXI : EVEN : LOG : ALL ? Returns the entire event log contents.

An example may look like the following:

```
"11/12/2007,18:14:10.770385,Error,LogOverwrite,Rise,,,,","11/12/2007,18:14:10.592105,Status,Measuring,Rise,,,,","11/12/2007,18:14:10.597758,Status,Measuring,Fall,,,,","11/12/2007,18:14:10.597786,Status,Sweeping,Fall,,,,","11/12/2007,18:14:10.599030,Status,WaitingForTrigger,Rise,,,,"
```

The contents of the Event Log vary, based on the operation of the instrument.

Instrument S/W Revision: A.01.60 or later

Specific Entry (Remote Only) Non-destructively retrieves a specifically indexed entry from the event log. Fields within an entry are comma delimited.

Remote Command: : LXI : EVENT : LOG : ENTRY ? <intIndex>
 Example: : LXI : EVEN : LOG : ENTR ? 0 Returns the first entry in the event log.

An example may look like the following:

```
"11/12/2007,18:14:10.770385,Error,LogOverwrite,Rise,,,,"
```

The contents of the Event Log vary, based on the operation of the instrument.

Instrument S/W Revision: A.01.60 or later

Beginning Entry (Remote Only) Sets or freezes the beginning entry of the log when in circular mode to the most recently added entry at the time of the command. This is so that the :LXI:EVENT:LOG:ENTtry? command has a reference entry for indexing individual entries in the log.

Remote Command: :LXI:EVENT:LOG:CIRCular:FBENtry

Example: :LXI:EVENT:LOG:CIRC:FBEN

Instrument S/W Revision: A.01.60 or later

Power On

The Power On menu key enables you to select how the instrument should power on. The options are: Mode and Input/Output Defaults, User Preset and Last State.

Remote Command :SYSTem: PON:TYPE MODE|USER|LAST|PRESet

:SYSTem: PON:TYPE?

Example :SYST: PON:TYPE MODE

Key Path **System**

Mode All

Preset This is unaffected by Preset but is set to Mode on a "Restore System Defaults->All"

State Saved No

Instrument S/W Revision A.01.60 or later

Mode and Input/Output Defaults

When the analyzer is powered on in Mode and Input/Output Defaults, it will perform a Restore Mode Defaults to all modes in the instrument and a Restore Input/Output Defaults as well.

Example SYST: PON:TYPE MODE

Key Path **System, Power On**

Mode All

Instrument S/W Revision A.01.60 or later

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 An instrument could never power up for the first time in User Preset.

Example	SYST:PON:TYPE USER
Key Path	System, Power On
Mode	All
Instrument S/W Revision	A.01.60 or later

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 An instrument could 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 will not work properly.

Restriction and Notes	Power on Last State only works if the user has 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 <code>:SYSTem:PDOWn</code> command.
Example	SYST:PON:TYPE LAST
Key Path	System, Power On
Mode	All
Instrument S/W Revision	A.01.60 or later

Power On Mode

This menu key brings up a Mode Menu that lists the available modes and lets you select which Mode is to be the power-on mode.

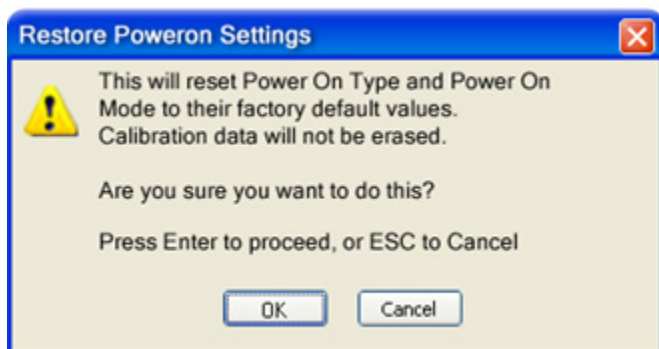
This Mode is used for Power On Mode and Input/Output Defaults and Restore System

Defaults All.

Remote Command	:SYSTem: PON:MODE SA BASIC ADEMOD NFIGURE PNOISE CDMA2K TDSCDMA VSA VSA89 601 WCDMA WIMAXOFDMA :SYSTem: PON:MODE?
Restriction and Notes	The list of possible modes (and remote parameters) to choose from is dependent on which modes are installed in the instrument.
Example	SYST:PON:MODE SA
Key Path	System, Power On
Mode	All
Preset	This is unaffected by Preset but is set on a “Restore System Defaults->All” to SA unless Spectrum Analysis mode is not installed in the instrument in which case the factory will load the default power-on mode.
State Saved	No
Instrument S/W Revision	A.01.60 or later

Restore Power On Defaults

This selection causes the Power On Type and Power On Mode 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 menu 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
Instrument S/W Revision	A.01.60 or later

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 specs to be impacted, for example:



Key Path	System
Instrument S/W Revision	A.01.60 or later

Auto Align

Configures the method for which the automatic background alignment is run.

Automatic background alignments are run periodically between measurement acquisitions. The instrument's software determines when alignments are to be performed to maintain warranted operation. The recommended setting for **Auto Align** is **Normal**.

An Auto Align execution cannot be aborted with the Cancel (ESC) key. To interrupt an Auto Align execution, select **Auto Align Off**.

Remote Command	:CALibration:AUTO ON PARTial OFF ALERT :CALibration:AUTO?
SCPI Status Bits/OPC Dependencies	When Auto Align is executing Bit 0 in the Status Operational register is set.
Dependencies/Couplings	Auto Align is set to Off if Restore Align Data is invoked.
Restriction and Notes	While Auto Align is executing, bit 0 of Status Operation register is set.
Example	:CAL:AUTO ON
Key Path	System, Alignments
Mode	All
Preset	This is unaffected by Preset but is set to ON upon a "Restore System Defaults->Align".
State Saved	No
Instrument S/W Revision	A.01.60 or later

Normal Auto Align, **Normal** turns on the automatic alignment of all measurement systems. **Auto Align, Normal** maintains the instrument in warranted operation across varying temperature and over time.

If the condition "Align Now, All required" is set, transition to **Auto Align, Normal** will

perform the required alignments and clear the “Align Now, All required” condition and then continue with further alignments as required to maintain the instrument adequately aligned for warranted operation.

When **Auto Align, Normal** is selected the Auto Align Off time is set to zero.

When **Auto Align, Normal** is selected the Settings Panel indicates ALIGN AUTO.

SCPI Status Bits/OPC Dependencies An interfering user signal may prevent automatic alignment of the RF subsystem. If this occurs, the Error Condition “Align skipped: 50 MHz interference” or “Align skipped: 4.8 GHz interference” is reported, the Status Questionable Calibration bit 11 is set, and the alignment proceeds. When a subsequent alignment of the RF subsystem succeeds, either by the next cycle of automatic alignment or from an **Align Now, RF**, the Error Condition and Status Questionable Calibration bit 11 are cleared.

Restriction and Notes Alignment processing as a result of the transition to Normal will be executed sequentially. Thus, *OPC? or *WAI following CAL:AUTO ON will return when the alignment processing is complete.

The presence of an external signal may interfere with the RF portion of the alignment. If so, the Error Condition “Align skipped: 50 MHz interference” or “Align skipped: 4.8 GHz interference” is reported, and bit 11 is set in the Status Questionable Calibration register. After the interfering signal is removed, subsequent alignment of the RF will clear the condition, and clear bit 11 in the Status Questionable Calibration register.

Example :CAL:AUTO ON

Key Path **System, Alignments, Auto Align**

Mode All

Instrument S/W Revision A.01.60 or later

Partial Auto Align, Partial disables the full automatic alignment and the maintenance of warranted operation for the benefit of improved measurement throughput. Accuracy is retained for the Resolution Bandwidth filters and the IF Passband which is critical to FFT accuracy, demodulation, and many measurement applications. With Auto Align set to **Partial**, you are now responsible for maintaining warranted operation by updating the alignments when they expire. The **Auto Align, Alert** mechanism will notify you when alignments have expired. One solution to expired alignments is to perform the **Align All, Now** operation. Another is to return the **Auto Align** selection to **Normal**.

Auto Align, Partial is recommended for measurements where the throughput is so important that a few percent of improvement is more valued than an increase in the accuracy errors of a few tenths of a decibel. One good application of **Auto Align, Partial** would be an automated environment where the alignments can be called during overhead time when

the device-under-test is exchanged.

When **Auto Align, Partial** is selected the elapsed time counter begins for Auto Align Off time.

When **Auto Align, Partial** is selected the Settings Panel indicates ALIGN PARTIAL with a warning icon. The warning icon is to inform the operator that they are responsible for maintaining the warranted operation of the instrument

Restriction and Notes	Auto Align Partial begins the elapsed time counter for Auto Align Off time.
Example	:CAL:AUTO PART
Key Path	System, Alignments, Auto Align
Mode	All
Instrument S/W Revision	A.01.60 or later

Off Auto Align, Off disables automatic alignment and the maintenance of warranted operation, for the benefit of maximum measurement throughput. With Auto Align set to **Off**, you are now responsible for maintaining warranted operation by updating the alignments when they expire. The **Auto Align, Alert** mechanism will notify you when alignments have expired. One solution to expired alignments is to perform the **Align All, Now** operation. Another is to return the **Auto Align** selection to **Normal**.

The **Auto Align, Off** setting is rarely the best choice, because **Partial** gives almost the same improvement in throughput while maintaining the warranted performance for a much longer time. The **Off** choice is intended for unusual circumstances such as the measurement of radar pulses where you might like the revisit time to be as consistent as possible.

When **Auto Align, Off** is selected the Auto Align Off time is initialized and the elapsed time counter begins.

When **Auto Align, Off** is selected the Settings Panel indicates ALIGN OFF with a warning icon. The warning icon is to inform the operator that they are responsible for maintaining the warranted operation of the instrument:

Dependencies/Couplings	Auto Align is set to Off if Restore Align Data is invoked.
Restriction and Notes	Auto Align Off begins the elapsed time counter for Auto Align Off time.
Example	:CAL:AUTO OFF
Key Path	System, Alignments, Auto Align
Mode	All
Instrument S/W Revision	A.01.60 or later

All but RF Auto Align, All but RF, configures automatic alignment to include or exclude the

RF subsystem. (Eliminating the automatic alignment of the RF subsystem prevents the input impedance from changing. The normal input impedance of 50 ohms can change to an open circuit when alignments are being used. Some devices under test do not behave acceptably under such circumstances, for example by showing instability.) When **Auto Align, All but RF ON** is selected, the operator is responsible for performing an **Align Now, RF** when RF-related alignments expire. The **Auto Align, Alert** mechanism will notify the operator to perform an **Align Now, All** when the combination of time and temperature variation is exceeded.

When **Auto Align, All but RF ON** is selected the Settings Panel indicates ALIGN AUTO/NO RF with a warning icon (warning icon is intended to inform the operator they are responsible for the maintaining the RF alignment of the instrument):

Remote Command	:CALibration:AUTO:MODE ALL NRF :CALibration:AUTO:MODE?
Example	:CAL:AUTO:MODE NRF
Key Path	System, Alignments, Auto Align
Mode	All
Preset	This is unaffected by Preset but is set to ALL on a “Restore System Defaults->Align”.
State Saved	No
Instrument S/W Revision	A.01.60 or later

Alert The instrument will signal an Alert when conditions exist such that you will need to perform a full alignment (for example, **Align Now, All**). The Alert can be configured in one of four settings; **Time & Temperature, 24 hours, 7 days**, or **None**. A confirmation is required when a selection other than **Time & Temperature** is chosen. This prevents accidental deactivation of alerts.

With **Auto Align** set to **Normal**, the configuration of **Alert** is not relevant because the instrument’s software maintains the instrument in warranted operation.

Remote Command	:CALibration:AUTO:ALERT TTEMPerature DAY WEEK NONE :CALibration:AUTO:ALERT?
Remote Command Notes	The alert that alignment is needed is the setting of bit 14 in the Status Questionable Calibration register.
SCPI Status Bits/OPC Dependencies	The alert is the Error Condition “Align Now, All required” and bit 14 is set in the Status Questionable Calibration register.
Example	:CAL:AUTO:ALER TTEM
Key Path	System, Alignments, Auto Align
Mode	All

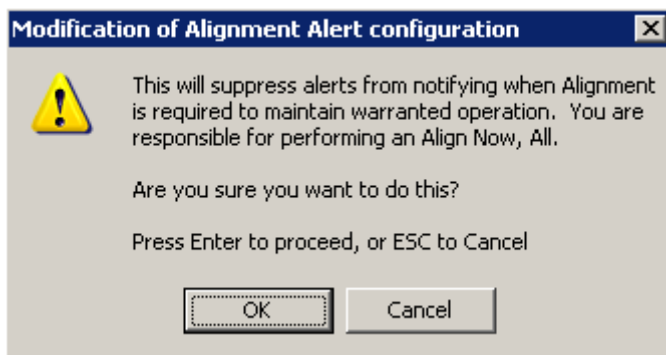
Preset	This is unaffected by Preset but is set to TTEMPerature on a “Restore System Defaults->Align”.
State Saved	No
Instrument S/W Revision	A.01.60 or later

Time & Temperature With Auto Align Alert set to **Time & Temperature** the instrument will signal an alert when alignments expire due to the combination of the passage of time and changes in temperature. The alert is the Error Condition “Align Now, All required”. If this choice for Alert is selected, the absence of an alert means that the analyzer alignment is sufficiently up-to-date to maintain warranted accuracy.

SCPI Status Bits/OPC Dependencies	Bit 14 is set in the Status Questionable Calibration register.
Example	:CAL:AUTO:ALER TTEM
Key Path	System, Alignments, Auto Align, Alert
Mode	All
Instrument S/W Revision	A.01.60 or later

24 hours With Auto Align Alert set to **24 Hours** the instrument will signal an alert after a time span of 24 hours since the last successful full alignment (for example, **Align Now, All** or completion of a full Auto Align). You may choose this selection in an environment where the temperature is stable on a daily basis at a small risk of accuracy errors in excess of the warranted specifications. The alert is the Error Condition “Align Now, All required”.

For front panel operation, confirmation is required to transition into this setting of Alert. The confirmation dialog is:



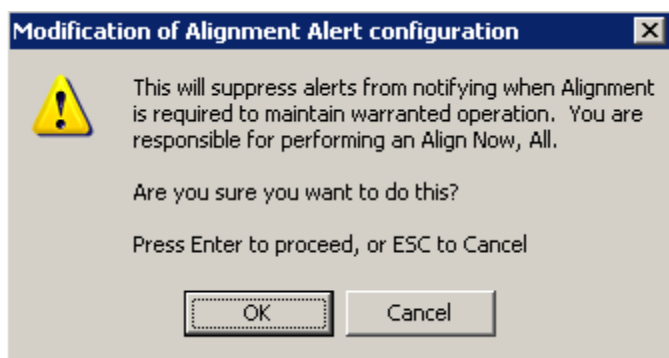
No confirmation is required when Alert is configured through a remote command.

SCPI Status Bits/OPC Dependencies	Bit 14 is set in the Status Questionable Calibration register.
Example	:CAL:AUTO:ALER DAY
Key Path	System, Alignments, Auto Align, Alert

Mode	All
Instrument S/W Revision	A.01.60 or later

7 days With Auto Align Alert is set to **7 days** the instrument will signal an alert after a time span of 168 hours since the last successful full alignment (for example, **Align Now**, **All** or completion of a full Auto Align). You may choose this selection in an environment where the temperature is stable on a weekly basis, at a modest risk of accuracy degradations in excess of warranted performance. The alert is the Error Condition “Align Now, All required”.

For front panel operation, confirmation is required for the customer to transition into this setting of Alert. The confirmation dialog is:

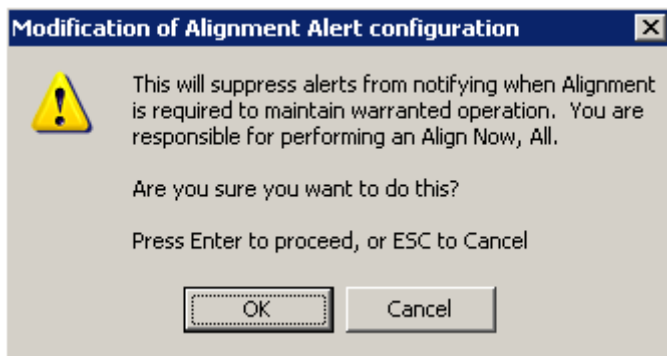


No confirmation is required when Alert is configured through a remote command.

SCPI Status Bits/OPC Dependencies	Bit 14 is set in the Status Questionable Calibration register.
Example	:CAL:AUTO:ALER WEEK
Key Path	System, Alignments, Auto Align, Alert
Mode	All
Instrument S/W Revision	A.01.60 or later

None With Auto Align Alert set to **None** the instrument will not signal an alert. This is provided for rare occasions where you are making a long measurement which cannot tolerate Auto Align interruptions, and must have the ability to capture a screen image at the end of the measurement without an alert posted to the display. Agilent does not recommends using this selection in any other circumstances, because of the risk of accuracy performance drifting well beyond expected levels without the operator being informed.

For front panel operation, confirmation is required to transition into this setting of Alert. The confirmation dialog is:



No confirmation is required when Alert is configured through a remote command.

Example	:CAL:AUTO:ALER NONE
Key Path	System, Alignments, Auto Align, Alert
Mode	All
Instrument S/W Revision	A.01.60 or later

Align Now

Accesses alignment processes that are immediate action operations. They perform complete operations and run until they are complete.

Key Path	System, Alignments
Instrument S/W Revision	A.01.60 or later

All Immediately executes an alignment of all subsystems. 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 “Align skipped: 50 MHz interference” or “Align skipped: 4.8 GHz interference” is set. In addition the Error Condition “Align Now, RF required” is set, 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 “Align Now, All required” is set, 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.

SCPI Status Bits/OPC Dependencies	Bits 11, 12, or 14 may be set in the Status Questionable Calibration register.
Remote Command	:CALibration[:ALL] :CALibration[:ALL]?
Dependencies/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.
Restriction and Notes	An interfering user supplied signal will result in the instrument requiring an Align Now, RF with the interfering signal removed.

Remote Command	:CALibration[:ALL]? returns 0 if successful
Notes	: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.
Example	:CAL
Key Path	System, Alignments, Align Now
Mode	All
Instrument S/W Revision	A.01.60 or later
Mode	All
Remote Command	*CAL?
Restriction and Notes	Everything about :CALibration[:ALL]? is synonymous with *CAL? including all conditions, status register bits, and couplings
Remote Command 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]?
Example	*CAL?
Instrument S/W Revision	A.01.60 or later

All but RF Immediately executes an alignment of all subsystems except the RF subsystem. 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 “Align Now, RF required” is asserted 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 “Align Now, All required” is set, 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.

Remote Command	:CALibration:NRF :CALibration:NRF?
SCPI Status Bits/OPC Dependencies	Bits 12 or 14 may be set in the Status Questionable Calibration register.
Dependencies/Couplings	Initializes the time for the Last Align Now, All Time. Records the temperature for the Last Align Now, All Temperature.
Remote Command 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”.
Example	:CAL:NRF
Key Path	System, Alignments, Align Now
Mode	All
Instrument S/W Revision	A.01.60 or later

RF Immediately executes an alignment of the RF subsystem. The instrument stops any measurement currently underway, performs the alignment, then restarts the measurement from the beginning (similar to pressing the **Restart** key).

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 raise the Error Condition “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.

A failure encountered during alignment will set the Error Condition “Align RF failed” and set bit 3 in the Status Questionable Calibration register.

Successful completion of **Align Now, RF** 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. It will also 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 “Align Now, RF required” is set, and bit 12 is set in the Status Questionable Condition register. None of the new alignment data is used.

Remote Command	:CALibration:RF :CALibration:RF?
SCPI Status Bits/OPC Dependencies	Bits 11, 12, or 14 may be set in the Status Questionable Calibration register.
Dependencies/Couplings	Initializes the time for the Last Align Now, RF Time. Records the temperature for the Last Align Now, RF Temperature.
Restriction and Notes	An interfering user supplied signal will result in the instrument requiring an Align Now, RF with the interfering signal removed.

Remote Command Notes	<p>:CALibration:RF? returns 0 if successful</p> <p>:CALibration:RF? returns 1 if failed (including interfering user signal)</p> <p>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.</p> <p>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.</p> <p>Successful completion will clear bits 3, 11, and 12 in the Status Questionable Calibration register.</p> <p>A failure encountered during alignment will set the Error Condition “Align RF failed” and set bit 3 in the Status Questionable Calibration register.</p> <p>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.</p>
Example	:CAL:RF
Key Path	System, Alignments, Align Now
Mode	All
Instrument S/W Revision	A.01.60 or later

Advanced

Advanced accesses alignment processes that are immediate action operations that perform operations that run until complete. Advanced alignments are performed on an irregular basis, or require additional operator interaction

Key Path	System, Alignments
Instrument S/W Revision	A.01.60 or later

Characterize Preselector (Only with Option 507, 508, 513, or 526) The Preselector tuning curve drifts over temperature and time. Recognize that the **Amplitude, Presel Center** function adjusts the preselector for accurate amplitude measurements at an individual frequency. **Characterize Preselector** improves the amplitude accuracy by ensuring the Preselector is approximately centered at all frequencies without the use of the **Amplitude, Presel Center** function. **Characterize Preselector** can be useful in situations where absolute amplitude accuracy is not of utmost importance, and the throughput savings or convenience of not performing a **Presel Center** is desired. **Presel Center** is required prior to any measurement for best (and warranted) amplitude accuracy.

Agilent recommends that the **Characterize Preselector** operation be performed yearly as part of any calibration, but performing this operation every three months can be worthwhile.

Characterize Preselector immediately executes a characterization of the Preselector, which is a YIG-tuned filter (YTF). The instrument stops any measurement currently underway, performs the characterization, then restarts the measurement from the beginning (similar to pressing the **Restart** key).

The query form of the remote commands (:CALibration:YTF?) will invoke the alignment of the YTF subsystem and return a success or failure value.

A failure encountered during alignment will set the Error Condition “Characterize YTF failed” and set bit 9 in the Status Questionable Calibration register.

Successful completion of **Advanced, Characterize Preselector** will clear the Error Condition “Characterize YTF failed”, and clear bit 9 in the Status Questionable Calibration register. It will also begin the elapsed time counter for Last Characterize Preselector Time, and capture the Last Characterize Preselector Temperature.

The last Characterize Preselector Time and Temperature must survive across the power cycle as this operation is performed infrequently.

Advanced, Characterize Preselector can be interrupted by pressing the Cancel (ESC) front-panel key or remotely with Device Clear followed by the :ABORt SCPI command. None of the new characterization data is then used.

Remote Command	:CALibration:YTF :CALibration:YTF?
Dependencies/Couplings	Initializes the time for the Last Characterize Preselector Time. Records the temperature for the Last Characterize Preselector Temperature.
Restriction and Notes	For Option 507, 508, 513, and 526 only.
Remote Command Notes	:CALibration:YTF? returns 0 if successful :CALibration:YTF? returns 1 if failed (including interfering user signal) While Advanced, Characterize Preselector 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 9 in the Status Questionable Calibration register. A failure encountered during alignment will set the Error Condition “Characterize Preselector failed” and set bit 9 in the Status Questionable Calibration register.
Example	:CAL:YTF
Key Path	System, Alignments, Align Now

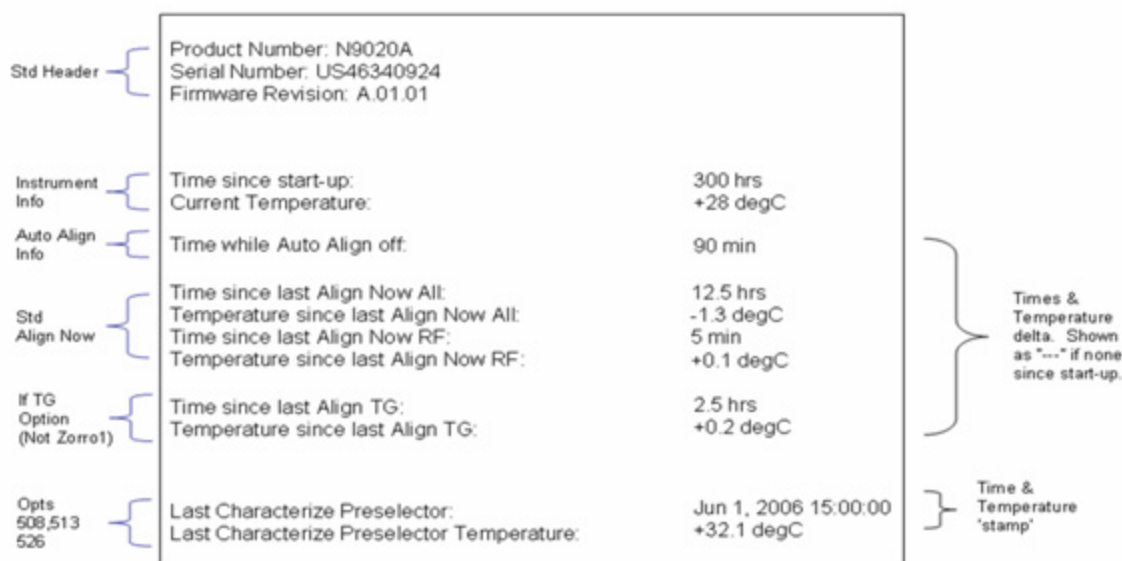
Mode All
Instrument S/W Revision A.01.60 or later

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 which 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.

Restriction and Notes The values displayed on the screen are only updated upon entry to the screen and not updated while the screen is being displayed.

Key Path **System, Alignments**

Mode All

Instrument S/W Revision A.01.60 or later

Remote Command	:SYSTem:PON:TIME?
Restriction and Notes	Value is the time since the most recent start-up in seconds.
Example	:SYST:PON:TIME?
Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
State Saved	No
Instrument S/W Revision	A.01.60 or later
Remote Command	:CALibration:TEMPerature:CURRent?
Restriction and Notes	Value is in degrees Centigrade. Value is invalid if using default alignment data (Align Now, All required)
Example	:CAL:TEMP:CURR?
Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
State Saved	No
Instrument S/W Revision	A.01.60 or later
Remote Command	:CALibration:TIME:LALL?
Restriction and Notes	Value is the elapsed time, in seconds, since the last successful Align Now, All or Align Now, All but RF was executed.
Example	:CAL:TIME:LALL?
Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
State Saved	No
Instrument S/W Revision	A.01.60 or later
Remote Command	:CALibration:TEMPerature:LALL?
Restriction and Notes	Value is in degrees Centigrade at which the last successful Align Now, All or Align Now, All but RF was executed.
Example	:CAL:TEMP:LALL?
Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
State Saved	No

System Functions
System

Instrument S/W Revision	A.01.60 or later
Remote Command	:CALibration:TIME:LRF?
Restriction and 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.
Example	:CAL:TIME:LRF?
Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
State Saved	No
Instrument S/W Revision	A.01.60 or later
Remote Command	:CALibration:TEMPerature:LRF?
Restriction and 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.
Example	:CAL:TEMP:LRF?
Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
State Saved	No
Instrument S/W Revision	A.01.60 or later
Remote Command	:CALibration:TIME:LPreselector?
Restriction and Notes	Value is date and time the last successful Characterize Preselector was executed. The date is separated from the time by a space character. Returns "" if no Characterize Preselector has ever been performed on the instrument.
Example	:CAL:TIME:LPR?
Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
State Saved	No
Instrument S/W Revision	A.01.60 or later
Remote Command	:CALibration:TEMPerature:LPreselector?
Restriction and Notes	Value is in degrees Centigrade at which the last successful Characterize Preselector was executed.

Example	:CAL:TEMP:LPR?
Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
State Saved	No
Instrument S/W Revision	A.01.60 or later
Remote Command	:CALibration:AUTO:TIME:OFF?
Restriction and Notes	Value is the elapsed time, in seconds, since Auto Align has been set to Off or Off with Alert. The value is 0 if Auto Align is ALL or NORF.
Example	:CAL:AUTO:TIME:OFF?
Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
State Saved	No
Instrument S/W Revision	A.01.60 or later

Timebase DAC

Allows control of the internal 10 MHz reference oscillator timebase. This may be used to adjust for minor frequency alignment between the signal and the internal frequency reference. This adjustment has no effect if the instrument is operating with an External Frequency Reference.

If the value of the Timebase DAC changes (by switching to Calibrated from User with User set to a different value, or in User with a new value entered) an alignment may be necessary. The alignment system will take appropriate action; which will either invoke an alignment or cause an Alert.

Remote Command	:CALibration:FREQuency:REFerence:MODE CALibrated USER :CALibration:FREQuency:REFerence:MODE?
Remote Command Notes	If the value of the timebase is changed the alignment system automatically performs an alignment or alerts that an alignment is due.
Restriction and Notes	If the value of the timebase is changed the alignment system automatically performs an alignment or alerts that an alignment is due.
Example	:CAL:FREQ:REF:MODE CAL
Key Path	System, Alignments
Mode	All

Preset	This is unaffected by Preset but is set to CALibrated on a “Restore System Defaults->Align”.
State Saved	No
Instrument S/W Revision	A.01.60 or later

Calibrated Sets the Timebase DAC to the value established during factory or field calibration. The value displayed on the menu key is the calibrated value.

Example	:CAL:FREQ:REF:MODE CAL
Key Path	System, Alignments, Timebase DAC
Mode	All
Instrument S/W Revision	A.01.60 or later

User Allows setting the Timebase DAC to a value other than the value established during the factory or field calibration. The value displayed on the menu key is the calibrated value.

Example	:CAL:FREQ:REF:MODE USER
Key Path	System, Alignments, Timebase DAC
Mode	All
Instrument S/W Revision	A.01.60 or later

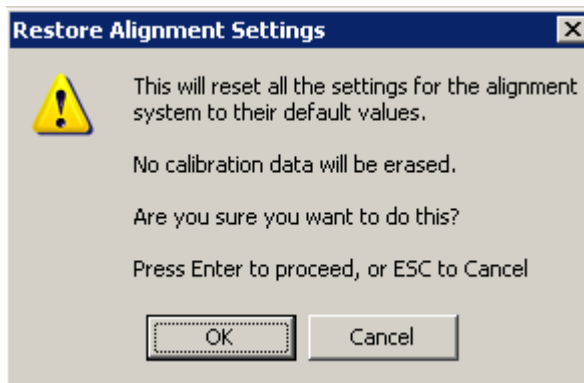
Remote Command	:CALibration:FREQuency:REFerence:FINE <integer> :CALibration:FREQuency:REFerence:FINE?
Dependencies/Couplings	Setting :CAL:FREQ:REF:FINE sets :CAL:FREQ:REF:MODE USER
Restriction and Notes	If the value of the timebase is changed the alignment system automatically performs an alignment or alerts that an alignment is due.
Example	:CAL:FREQ:REF:FINE 8191
Key Path	System, Alignments, Timebase DAC
Mode	All
Preset	This is unaffected by Preset but is set to the factory setting on a “Restore System Defaults->Align”.
State Saved	No
Min	0

Max	16383
Instrument S/W Revision	A.01.60 or later
Remote Command:	:CALibration:FREQuency:REFerence:COARse <integer> :CALibration:FREQuency:REFerence:COARse?
Remote Command Notes:	This is an alias for CAL:FREQ:REF:FINE any change to COARse is reflected in FINE and vice-versa. See CAL:FREQ:REF:FINE for description of functionality.
Dependencies/Couplings:	Setting :CAL:FREQ:REF:COAR sets :CAL:FREQ:REF:MODE USER
Example:	:CAL:FREQ:REF:COAR 8191
Instrument S/W Revision:	A.01.60 or later

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:

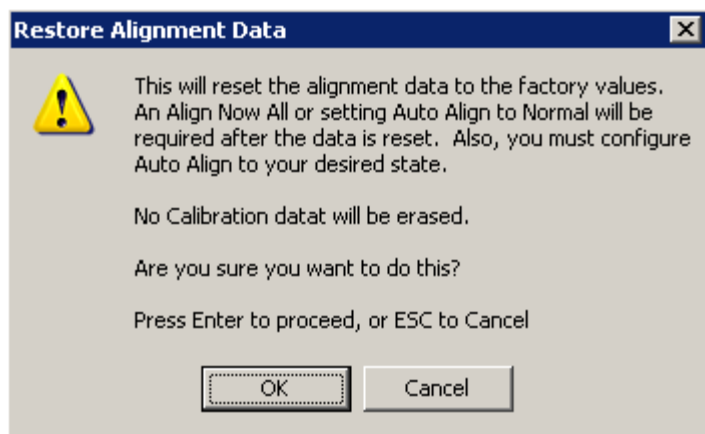
Parameter	Setting
Timebase DAC	Calibrated
Timebase DAC setting	Calibrated value
Auto Align State	Normal (if the instrument is not operating with default alignment data, Off otherwise)
Auto Align All but RF	Off
Auto Align Alert	Time & Temperature

Restriction and 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.
Example	:SYST:DEF ALIG
Key Path	System, Alignments
Mode	All
Instrument S/W Revision	A.01.60 or later

Restore Align Data

Initializes the alignment data to the factory default values. This action is normally not necessary. It is recommended if alignment errors occur. If alignment errors continue to occur after Restore Align Data, the instrument is in need of repair. Align Now, All must be executed to regain warranted operation, and the user is responsible for configuring Auto Align thereafter.

For front panel operation, confirmation is required before setting the alignment data to factory defaults. The confirmation dialog is:



The Error Condition “Align Now, All required” is set, and bit 14 in the Status Questionable Calibration register is set. Auto Align is set to Off.

Remote Command	:CALibration:DATA:DEFault
Dependencies/Couplings	Sets Auto Align to Off. Sets bit 14 in the Status Questionable Calibration register. The Error Condition “Align Now, All required” is set.
Example	:CAL:DATA:DEF
Key Path	System, Alignments
Mode	All
Instrument S/W Revision	A.01.60 or later

I/O Config

Activates a menu for identifying and changing the I/O configuration for remote control.

Key Path	System
Instrument S/W Revision	A.01.60 or later

GPIB Address

Select the GPIB remote address.

Remote Command	:SYSTem:COMMunicate:GPIB[1][:SELF]:ADDRESS <integer> :SYSTem:COMMunicate:GPIB[1][:SELF]:ADDRESS?
Remote Command Notes	Note: Changing the Address on the GPIB port requires all further communication to use the new address.
Example	:SYST:COMM:GPIB:ADDR 17
Key Path	System, I/O Config
Mode	All
Preset	This is unaffected by Preset but is set to 18 on a “Restore System Defaults->Misc”
State Saved	No
Range	0 to 30
Instrument S/W Revision	A.01.60 or later

SCPI LAN Menu

Activates a menu for identifying and changing the SCPI over 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.

Key Path	System, I/O Config
Instrument S/W Revision	A.01.60 or later

SCPI Telnet Turns the SCPI LAN telnet capability On or Off allowing you to limit SCPI access over LAN through telnet.

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

Key Path	System, I/O Config, SCPI LAN
Mode	All
Preset	This is unaffected by Preset but is set to ON with a “Restore System Defaults->Misc”
State Saved	No
Range	On Off
Instrument S/W Revision	A.01.60 or later

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.

Remote Command	:SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle OFF ON 0 1 :SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle?
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Example :SYST:COMM:LAN:SCPI:SOCK:ENAB OFF

Key Path	System, I/O Config, SCPI LAN
Mode	All
Preset	This is unaffected by Preset but is set to ON with a “Restore System Defaults->Misc”
State Saved	No
Range	On Off
Instrument S/W Revision	A.01.60 or later

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?
Preset	This is unaffected by Preset or “Restore System Defaults->Misc”.
State Saved	No
Range	0 to 65534
Example	:SYST:COMM:LAN:SCPI:SOCK:CONT?

Instrument S/W Revision A.01.60 or later

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
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	
Key Path	System, I/O Config, SCPI LAN	
Mode	All	
Preset	This is unaffected by Preset, but is set to ON with a "Restore System Defaults->Misc"	
State Saved	No	
Range	On Off	
Instrument S/W Revision	A.01.60 or later	

Query USB Connection (Remote Command Only)

Enables you to determine the speed of USB connection.

Mode	All
Remote Command	:SYSTem:COMMunicate:USB:CONNecion?
State Saved	No
Range	NONE LSPeed HSPeed FSPeed

Remote Command Notes	NONE – Indicates no USB connection has been made. LSpeed – Indicates a USB low speed connection (1.5 Mbps). Note: this is reserved for future use, the T+M488 protocol is not supported on low speed connections. HSPeed – Indicates that a USB high speed connection (480 Mbps) has been negotiated. FSPEED – Indicates that a USB full speed connection (12 Mbps) has been negotiated.
Example	:SYST:COMM:USB:CONN?
Instrument S/W Revision	A.01.60 or later

USB Connection Status (Remote Command Only)

Enables you to determine the current status of the USB connection.

Mode	All
Remote Command	:SYSTem:COMMunicate:USB:STATus?
State Saved	No
Range	SUSPended ACTive
Remote Command Notes	SUSPended – Indicates that the USB bus is currently in its suspended state. The bus is in the suspended state when: The bus is not connected to any controller The controller is currently powered off The controller has explicitly placed the USB device into the suspended state. When in the suspended state, no USB activity, including start of frame packets are received. ACTive – Indicates that the USB device is in the active state. When the device is in the active state, it is receiving periodic start of frames but it isn't necessarily receiving or transmitting data.
Example	:SYST:COMM:USB:STAT?
Instrument S/W Revision	A.01.60 or later

USB Packet Count (Remote Command Only)

Enables you to determine the number of packets received and transmitted on the USB bus.

Mode	All
Remote Command	:SYSTem:COMMunicate:USB:PACKets?
State Saved	No

Remote Command Notes	Two integers are returned. The first is the number of packets received since application invocation, the second is the number of packets transmitted since application invocation. If no packets have been received or transmitted the response is 0,0. The packet count is initialized to 0,0 when the instrument application is started.
Example	:SYST:COMM:USB:PACK?
Instrument S/W Revision	A.01.60 or later

LXI Configuration

Pressing this key opens a menu that allows you to access the various LXI configuration properties.

TIP	For information about setting up measurements using LXI, refer to the "Programmer's Guide" located in your analyzer at: C:/Program Files/Agilent/Signal Analysis/Help/Bookfiles/x_series_prog.pdf. It is also available by selecting the "Additional Documentation" page of the Help.
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Key Path	System, I/O Config
Instrument S/W Revision	A.01.60 or later

LAN Reset This key resets the LAN connection.

Key Path	System, I/O Config, LXI
Instrument S/W Revision	A.01.60 or later

LXI Domain The instrument only receives LXI LAN Events sent by members of the same LXI Domain. Conversely, LXI Output LAN Events sent by the instrument can only be received by members of the same LXI Domain. This is not the same as the IEEE 1588 domain (see "[Domain \(Remote Only\)](#)" on page 232).

Key Path	System, I/O Config, LXI
Remote Command	:LXI:EVENT:DOMain <intDomain> :LXI:EVENT:DOMain?
Example	:LXI:EVEN:DOM 128 :LXI:EVEN:DOM?
Preset	Not affected by a Preset. The default value of "0" can be restored by pressing Restore Defs, Input/Output Settings
State Saved	Saved in instrument state.

Range	0–255
Instrument S/W Revision	A.01.60 or later

LXI Output LAN Events The device can be configured to send LXI LAN Events as the instrument's state changes. Specifically, it can notify other devices as the status signals WaitingForTrigger, Sweeping, Measuring, OperationComplete, and Recalling transition. Additionally, Output LAN Events can be sent in response to the receipt of any of the Input LAN Events.

This is the entry point for the LXI Output LAN Event system. This key branches to a list of events that can be sent out on the LAN in response to instrument events.

Key Path	System, I/O Config
Instrument S/W Revision	A.01.60 or later

Disable All This command causes the Enable property of all members of the LXI Output LAN Event List to be set to OFF.

Key Path	System, I/O Config, LXI, LXI Output LAN Events
Remote Command	:LXI:EVENT[:OUTPut]:LAN:DISable:ALL
Example	:LXI:EVENT:LAN:DIS:ALL
Instrument S/W Revision	A.01.60 or later

Output LAN Event List This is the list of LXI Output LAN events that can be sent in response to an instrument event such as sweeping or waiting for a trigger. Each member of this list has a key in the LXI Output LAN Events panel. The list can grow and shrink in response to Add and Remove commands respectively. New pages must be added and removed automatically as the list size changes. Only the first 14 characters of an LXI Output LAN Event name are displayed on the key.

Remote Command	:LXI:EVENT[:OUTPut]:LAN:LIST?
Example	:LXI:EVENT:LAN:LIST?

Returns the complete list of Output LAN Events which is, at minimum: "LAN0", "LAN1", "LAN2", "LAN3", "LAN4", "LAN5", "LAN6", "LAN7", "WaitingForTrigger", "Measuring", "Sweeping", "OperationComplete", "Recalling"

Key Path	System, I/O Config, LXI, LXI Output LAN Events
Preset	Not affected by a Preset. The default values can be restored by pressing Restore Defs, Input/Output Settings. Preset/Default values: "LAN0", "LAN1", "LAN2", "LAN3", "LAN4", "LAN5", "LAN6", "LAN7", "WaitingForTrigger", "Measuring", "Sweeping", "OperationComplete", "Recalling"
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Add (Remote Only) Adds the provided string to the list of possible LAN events to output as a response to instrument events. As new LAN events are added, keys are generated in the LXI Output LAN Events menu. New key panels are generated as the number of possible LAN events increases past a multiple of six, and the “More” keys are updated to reflect the new number of key panels in the LXI Output LAN Events menu.

Remote Command: : LXI : EVENT [: OUTPut] : LAN : ADD "LANEVENT"

Example: : LXI : EVEN : LAN : ADD "LANEVENT"

State Saved: No

Range: Uppercase, Lowercase, Numeric, Symbol except for comma or semicolon

Restriction and Notes: The maximum length of the string is 16 characters.
 Longer strings are concatenated and added to the LXI Output LAN Event list.
 No event is added if the LAN Event already exists.

Instrument S/W Revision: A.01.60 or later

Remove (Remote Only) Removes the provided string from the list of possible LAN events to output as a response to instrument events. As new LAN events are removed, keys are removed from the LXI Output LAN Events menu. Key panels are removed as the number of possible LAN events decreases past a multiple of six, and the “More” keys are updated to reflect the new number of key panels in the LXI Output LAN Events menu. Events from the default list cannot be removed.

Remote Command: : LXI : EVENT [: OUTPut] : LAN : REMove [: EVENT] "LANEVENT"

Example: : LXI : EVEN : LAN : REM "LANEVENT"

State Saved: No

Range: Uppercase, Lowercase, Numeric, Symbol

Restriction and Notes: The maximum length of the string is 16 characters.
 Longer strings are concatenated and the resulting LAN Event is removed from the LXI Output LAN Event list.
 Nothing happens if the LAN event was not introduced using the Add command.

Instrument S/W Revision: A.01.60 or later

Remove All (Remote Only) Clears the list of custom LAN events (those introduced using the Add command) that are available to output as a response to instrument events. As new LAN events are removed, keys are removed from the LXI Output LAN Events menu. Key panels are removed as the number of possible LAN events decreases past a multiple of six, and the “More” keys are updated to reflect the new number of key panels in the LXI Output LAN Events menu.

Remote Command: : LXI : EVENT [: OUTPut] : LAN : REMove : ALL

Example: : LXI : EVEN : LAN : REM : ALL

Restriction and Notes: Only LAN Events added with the Add command are removed.
Default events cannot be removed.

Instrument S/W Revision: A.01.60 or later

Source Sets the instrument event that this LXI Output LAN event is tied to.

The possible instrument events are “WaitingForTrigger”, “Sweeping”, “Measuring”, “OperationComplete”, and “Recalling”.

The key is labeled with the value of the selected source.

For the instrument event specific LXI Output LAN Events “WaitingForTrigger,” “Sweeping,” “Measuring,” “OperationComplete,” and “Recalling,” this parameter is set to the corresponding source value and cannot be changed. For these events, the Source key does not appear.

WaitingForTrigger, Measuring, and Sweeping correspond to the standard trigger state machine activities for which they are named.

OperationComplete is low when a measurement operation is underway. For example, OperationComplete is low throughout a list sweep measurement, even though Sweeping, Measuring, and WaitingForTrigger will undergo a number of transitions. In this case, OperationComplete goes high when the entire list sweep is finished.

Recalling is high while the instrument is actively recalling a state.

Additionally, the Source parameter can be set to the name of any Input LAN Event. This causes the Output LAN Event to be sent upon receipt of the named Input LAN Event. There is no front panel support for these events.

The default list of available Input LAN Events is:

- “LAN0”
- “LAN1”
- “LAN2”
- “LAN3”
- “LAN4”
- “LAN5”
- “LAN6”
- “LAN7”
-

Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:SOURce "LANEVENT", "SourceEvent" :LXI:EVENT[:OUTPut]:LAN[:SET]:SOURce? "LANEVENT"
Example	:LXI:EVENT:LAN:SOUR "LANEVENT","WaitingForTrigger"
Restriction and Notes	The maximum length of the string is 45 characters.
Key Path	System, I/O Config, LXI, LXI Output LAN Events, LAN[n]

Preset	Not affected by a Preset. The default values can be restored by pressing Restore Defs, Input/Output Settings. Preset/Default values: "Sweeping" (The Output LAN Events "WaitingForTrigger", "Sweeping", "Measuring", "OperationComplete", and "Recalling" all have default source parameters that match their names)
State Saved	Saved in instrument state.
Range	"WaitingForTrigger" "Sweeping" "Measuring" "OperationComplete" "Recalling" "LAN0" "LAN1" "LAN2" "LAN3" "LAN4" "LAN5" "LAN6" "LAN7" any user-added Input LAN Event
Instrument S/W Revision	A.01.60 or later

Destination (Remote Only) Outgoing LAN events are sent to the hosts enumerated in the destination expression. This expression takes the form of "host1:port1, host2:port2, ..." where port numbers are optional, and default to the IANA assigned TCP port (5044). To designate a UDP broadcast at the default port, set the destination string to "" or "ALL". To designate a UDP broadcast at a specific port, set the destination string to ":port" or "ALL:port".

Examples:

- "192.168.0.1:23"
- "agilent.com, soco.agilent.com"
- "agilent.com:80, 192.168.0.1"

Remote Command:	:LXI:EVENT[:OUTPut]:LAN[:SET]:DESTination "LANEVENT", "destinationExpression" :LXI:EVENT[:OUTPut]:LAN[:SET]:DESTination? "LANEVENT"
Example:	:LXI:EVEN:LAN:DEST "LANEVENT", "host1, 192.168.0.1:80"
Preset:	Not affected by a Preset. The default value of "ALL" can be restored by using the command: :SYSTem:DEFault INPut
State Saved:	Saved in instrument state.
Range:	Uppercase, Lowercase, Numeric, Symbol
Restriction and Notes:	The maximum length of the string is 45 characters.
Instrument S/W Revision:	A.01.60 or later

Drive Determines the behavior of an output event.

- Normal designates typical operation, where both edges of the instrument event are transmitted,
- Off disables the LAN event.

- Wired-OR causes only one edge to be transmitted.

Key Path	System, I/O Config, LXI, LXI Output LAN Events, LAN[n]
Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:DRIVE "LANEVENT", OFF NORMAl WOR :LXI:EVENT[:OUTPut]:LAN[:SET]:DRIVE? "LANEVENT"
Example	:LXI:EVENT:LAN:DRIVE "LANEVENT",WOR
Preset	Not affected by a Preset. The default value of "NORMAl" can be restored by using the command: :SYSTEM:DEFAULT INPUT
State Saved	Saved in instrument state.
Range	OFF NORMAl WOR
Instrument S/W Revision	A.01.60 or later

Slope Slope determines which instrument event transition results in a LAN packet being sent and whether or not that edge is inverted.

When the Drive parameter is set to Normal, a Slope of Negative causes both edges to be inverted before they are transmitted. A Positive Slope transmits the edges unaltered.

When the Drive parameter is set to WOR, only Positive edges are transmitted. When the Slope is Negative, a falling edge is inverted and sent as a rising edge. When the Slope is Positive, a rising edge is sent normally.

The following table illustrates the effects of the Slope and Drive parameters.

Instrument Event Edge	Slope Parameter	Drive Parameter	Action
0	Negative	Off	Not sent
0	Positive	Off	Not sent
1	Negative	Off	Not sent
1	Positive	Off	Not sent
0	Negative	Normal	1
0	Positive	Normal	0
1	Negative	Normal	0
1	Positive	Normal	1
0	Negative	Wired OR	1
0	Positive	Wired OR	Not sent
1	Negative	Wired OR	Not sent
1	Positive	Wired OR	0

Key Path	System, I/O Config, LXI, LXI Output LAN Events, LAN[n]
Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:SLOPe "LANEVENT", POSitive NEGative :LXI:EVENT[:OUTPut]:LAN[:SET]:SLOPe? "LANEVENT"
Example	:LXI:EVEN:LAN:SLOP "LANEVENT",POS
Preset	Not affected by a Preset. The default value of "Positive" can be restored by using the command: :SYSTem:DEFault INPut
State Saved	Saved in instrument state.
Range	POSitive NEGative
Instrument S/W Revision	A.01.60 or later

Timestamp Delta This parameter represents a time in seconds to add to the timestamp of the Output LAN Event. This timestamp delta allows the receiving instrument to delay its response until the time specified in the timestamp.

Key Path	System, I/O Config, LXI, LXI Output LAN Events, LAN[n]
Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:TSDelta "LANEVENT", <seconds> :LXI:EVENT[:OUTPut]:LAN[:SET]:TSDelta? "LANEVENT"
Example	:LXI:EVEN:LAN:TSD "LANEVENT",10.5 s
Preset	Not affected by a Preset. The default value of "0.0 s" can be restored by using the command: :SYSTem:DEFault INPut
State Saved	Saved in instrument state.
Range	0.0 – 1.7976931348623157 x 10308 s (Max Double)
Instrument S/W Revision	A.01.60 or later

Enabled If this parameter is set to ON, this LAN Event is sent when the selected Source instrument event occurs.

Otherwise, this LAN Event is never output.

Key Path	System, I/O Config, LXI, LXI Output LAN Events, LAN[n]
Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:ENABled "LANEVENT",ON OFF 1 0 :LXI:EVENT[:OUTPut]:LAN[:SET]:ENABled? "LANEVENT"
Example	:LXI:EVEN:LAN:ENAB "LAN0",ON

Preset	Not affected by a Preset. The default value of "OFF" can be restored by using the command: :SYSTem:DEFault INPut
State Saved	Saved in instrument state.
Range	OFF ON 0 1
Instrument S/W Revision	A.01.60 or later

Count (Remote Only) Returns the number of items in the LXI Output LAN Event List.

Remote Command:	:LXI:EVENT[:OUTPut]:LAN:COUNT?
Example:	:LXI:EVENT:LAN:COUN?
Instrument S/W Revision:	A.01.60 or later

Configure (Remote Only) Allows the configuration of some of the above parameters from a single SCPI command.

Remote Command:	:LXI:EVENT[:OUTPut]:LAN[:SET]:CONFigure "lanEvent", <enabled>, <source>, <slope>, <drive>, <destination>
Example:	:LXI:EVENT:LAN:CONF "LAN0",1,"WaitingForTrigger",POS,NORM,"ALL"
Instrument S/W Revision:	A.01.60 or later

Send (Remote Only) Forces the instrument to send the requested LAN Event. The LAN Event must be enabled, otherwise this command is ignored.

Remote Command:	:LXI:EVENT[:OUTPut]:LAN:SEND "LANEVENT", RISE FALL
Example:	:LXI:EVENT:LAN:SEND "LANEVENT", FALL
Instrument S/W Revision:	A.01.60 or later

Identifier (Remote Only) Sets the string that will be placed in the peer-to-peer packet when the Output LAN Event is transmitted. The Identifier is variable to allow for easier system debugging. The Identifier must be unique, for example the "LAN0" and "LAN1" output events cannot have identical identifiers.

Remote Command:	:LXI:EVENT[:OUTPut]:LAN[:SET]:IDENTifier "LANEVENT", "identifier" :LXI:EVENT[:OUTPut]:LAN[:SET]:IDENTifier? "LANEVENT"
Example:	:LXI:EVENT:LAN:IDEN"LAN0","debugstring"
State Saved:	Saved in instrument state.
Range:	Uppercase, Lowercase, Numeric, Symbol

Restriction and Notes: The maximum length of the string is 16 characters.
Nothing happens if the LAN event does not exist.
The default value is that the identifier is equivalent to the name of the LAN Event.

Instrument S/W Revision: A.01.60 or later

IEEE 1588 Time (Remote Only)

Time Epoch Time (Remote Only) If the device is selected as the IEEE 1588 master clock, this sets the clock using the number of seconds elapsed since January, 1 1970 at 00:00:00 in International Atomic Time (TAI). Epoch time is time zone invariant. Otherwise, this allows the user to query the epoch time.

Remote Command: :LXI:CLOCK[:TIME][:VALUE] <seconds>,<fractionalSeconds>

Example: :LXI:CLOC 10020304.0 s,0.123456 s

Preset: Not affected by a Preset. The default value of "System Time" can be restored by using the command:
:SYSTEM:DEFAULT INPUT

State Saved: No

Range: Seconds: 0.0 – 1.7976931348623157 x 10308 s (Max Double)
Fraction: 0.0 s – 0.999999 s

Restriction and Notes: The seconds argument must only contain values representing whole seconds. For example 1243.0 s is acceptable, but 1243.01 results in an error.
Ignored when the device is not selected as the IEEE 1588 master clock.
The fractional portion is only accurate to the microseconds position.
Error generated if the seconds argument contains a fractional portion.

Instrument S/W Revision: A.01.60 or later

Remote Command: :LXI:CLOCK[:TIME][:VALUE] ?

Example: :LXI:CLOC?

Preset: System time

State Saved: No

Range: Seconds: 0.0 – 1.7976931348623157 x 10308 s (Max Double)
Fraction: 0.0 s – 0.999999 s

Restriction and Notes: The seconds argument must only contain values representing whole seconds. For example 1243.0 s is acceptable, but 1243.01 results in an error.

Ignored when the device is not selected as the IEEE 1588 master clock.

The fractional portion is only accurate to the microseconds position.

Error generated if the seconds argument contains a fractional portion.

Instrument S/W Revision: A.01.60 or later

Seconds (Remote Only) If the device is selected as the IEEE 1588 master clock, this sets the seconds portion of the clock. Otherwise, this allows the user to query the seconds portion of the epoch time. Valid values are in discrete increments of whole seconds.

Remote Command: :LXI:CLOCK[:TIME]:SECONDS <seconds>
:LXI:CLOCK[:TIME]:SECONDS?

Example: :LXI:CLOC:SEC 10020304.0

Preset: Not affected by a Preset. The default value of "System Time" can be restored by using the command:
:SYSTEM:DEFAULT INPUT

State Saved: No

Range: 0.0 – 1.7976931348623157 x 10308 s (Max Double)

Restriction and Notes: Ignored when the device is not selected as the IEEE 1588 master clock.

Error generated if the argument contains a fractional portion. For example 1243.0 s is acceptable, but 1243.01 results in an error.

Instrument S/W Revision: A.01.60 or later

Fraction (Remote Only) If the device is selected as the IEEE 1588 master clock, this sets the sub-second value of the clock. Otherwise, this allows the user to query the sub-second value of the epoch time.

Remote Command: :LXI:CLOCK[:TIME]:FRACTION <fraction>
:LXI:CLOCK[:TIME]:FRACTION?

Example: :LXI:CLOC:FRAC 10 ms

Preset: Sub-second value of system time

State Saved: No

Range: [0.0,1.0)

Restriction and Notes: Ignored when the device is not selected as the IEEE 1588 master clock.
Only accurate to the microseconds position.

Instrument S/W Revision: A.01.60 or later

Local Time (Remote Only) Returns the current local time formatted as a date time string.

Remote Command: :LXI:CLOCK[:TIME]:LOCAL?

Example: :LXI:CLOC:LOC? Returns "5/15/2007 6:23:34.123456"

Notes: LXI:CLOCK[:TIME]:LOCAL? Returns Any string constituting a valid date and time

Instrument S/W Revision: A.01.60 or later

Leap Second Offset (Remote Only) Enables you to set the leap second offset between the UTC and TAI time standards.

Remote Command: :LXI:CLOCK[:TIME]:LSOFFSET <integer>
:LXI:CLOCK[:TIME]:LSOFFSET?

Example: :LXI:CLOC:LSOF 55

Range: 0 – 2147483647 (Max Integer)

Instrument S/W Revision: A.01.60 or later

International Atomic Time (Remote Only) Retrieves the current time using the TAI format.

Remote Command: :LXI:CLOCK[:TIME]:TAI?

Example: :LXI:CLOC:TAI? "5/15/2007 6:23:34.123456"

Notes: :LXI:CLOCK[:TIME]:TAI? Returns Any string constituting a valid date and time

Instrument S/W Revision: A.01.60 or later

Time Zone (Remote Only) Retrieves the current local time zone as an offset in hours, minutes, and seconds from Greenwich Mean Time.

Remote Command: :LXI:CLOCK[:TIME]:TZON?

Example: :LXI:CLOC:TZON?

Notes: :LXI:CLOC:TZON? returns "01:00:00" if the current local time zone is 1 hour ahead from Greenwich Mean Time

Instrument S/W Revision: A.01.60 or later

Daylight Savings (Remote Only) Retrieves the current status of the Windows System setting

for Daylight Savings Time. Whether or not daylight savings time is in effect influences the time zone parameter.

Remote Command: : LXI :CLOCK [: TIME] : DLSavings?
Example: : LXI:CLOC:DLS?
Notes: : LXI:CLOC:DLS? Returns 1 when Daylight Savings Time is On and 0 if the when Daylight Savings Time is Off
Preset: The Windows system Daylight Savings setting.
Instrument S/W Revision: A.01.60 or later

Coordinated Universal Time (Remote Only) Retrieves the current time using the UTC format.

Remote Command: : LXI :CLOCK [: TIME] : UTC?
Example: : LXI:CLOC:UTC? "5/15/2007 6:23:34.123456"
Notes: : LXI:CLOC:UTC? Returns Any string constituting a valid date and time
Instrument S/W Revision: A.01.60 or later

Time Marker (Remote Only) Records the PTP time as a marker that can later be measured against the current PTP time. Typical use is to time the length of a sequence of instrument operations. There are 9 available markers with indices 1 – 9.

Remote Command: : LXI :CLOCK [: TIME] : MARKer [1] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 [: SET]
Example: : LXI:CLOC:MARK1
 : LXI:CLOC:MARK2
 : LXI:CLOC:MARK3
 : LXI:CLOC:MARK4
 : LXI:CLOC:MARK5
 : LXI:CLOC:MARK6
 : LXI:CLOC:MARK7
 : LXI:CLOC:MARK8
 : LXI:CLOC:MARK9
 : LXI:CLOC:MARK
Instrument S/W Revision: A.01.60 or later

Time Marker Clear (Remote Only) Clears the recorded PTP time marker used to measure against the current PTP time. There are 9 available markers with indices 1 – 9.

Remote Command: : LXI :CLOCK [: TIME] : MARKer [1] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 : CLEAR

Example: : LXI:CLOC:MARK1:CLEAR
 : LXI:CLOC:MARK2:CLEAR
 : LXI:CLOC:MARK3:CLEAR
 : LXI:CLOC:MARK4:CLEAR
 : LXI:CLOC:MARK5:CLEAR
 : LXI:CLOC:MARK6:CLEAR
 : LXI:CLOC:MARK7:CLEAR
 : LXI:CLOC:MARK8:CLEAR
 : LXI:CLOC:MARK9:CLEAR
 : LXI:CLOC:MARK:CLEAR

Instrument S/W Revision: A.01.60 or later

Time Marker Delta (Remote Only) Calculates and returns the delta time from the marker to the present PTP time. Also returns the seconds and sub-seconds portions of the start and end times. There are 9 available markers with indices 1 – 9.

Remote Command: : LXI:CLOCK[:TIME]:MARKer[1|2|3|4|5|6|7|8|9]:DELTA?

Example: : LXI:CLOC:MARK1:DELT? returns
 <deltaTime>,<startSeconds>,<startFractionalSeconds>,<endSeconds>,<endFractionalSeconds>
 : LXI:CLOC:MARK2:DELT?
 : LXI:CLOC:MARK3:DELT?
 : LXI:CLOC:MARK4:DELT?
 : LXI:CLOC:MARK5:DELT?
 : LXI:CLOC:MARK6:DELT?
 : LXI:CLOC:MARK7:DELT?
 : LXI:CLOC:MARK8:DELT?
 : LXI:CLOC:MARK9:DELT?
 : LXI:CLOC:MARK:DELT?

Notes: : LXI:CLOCK[:TIME]:MARKer[1|2|3|4|5|6|7|8|9]:DELTA?
 Returns a value between 0.0 – 1.7976931348623157 x 10308 s (Max Double)

Range: 0.0 – 1.7976931348623157 x 10308 s (Max Double)

Instrument S/W Revision: A.01.60 or later

Measurement Data Timestamp (Remote Only) Returns the beginning and ending times of the last measurement cycle. This command also returns the duration of the measurement cycle. These

values correspond to the last rising and falling transition of the Measuring instrument event.

Remote Command: : LXI : CLOcK [: TIME] : MEASure [: DELTA] ?
Example: : LXI : CLOC : MEAS ? Returns
 2.0,1145902.0,0.123456, ,1145904.0,0.123456
Notes: : LXI : CLOCk [: TIME] : MARKer [1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 : DELTA ?
 Returns a value between 0.0 – 1.7976931348623157 x 10308 s (Max
 Double)
Instrument S/W Revision: A.01.60 or later

Clear Measurement Data Timestamp (Remote Only) Forces the return values of the Measurement Data Timestamp to zero until the next measurement cycle occurs. This command need not be issued for the Measurement Data Timestamp to be refreshed.

Remote Command: : LXI : CLOcK [: TIME] : MEASure : CLear
Example: : LXI : CLOC : MEAS : CLE
Instrument S/W Revision: A.01.60 or later

Precision Time Protocol Precision Time Protocol, as defined by IEEE 1588, is a method for synchronizing the time across a network. Instruments participating in the PTP network can coordinate activities using this common time base.

Accuracy (Remote Only) Sets the typical offset from the correct time that a user can expect from the instrument PTP clock. This parameter is used when the instrument is selected as the Master clock. It should be set along with the time when configuring a master clock.

The value should be chosen by judging how precisely the clock can be set to the exact TAI time and the accuracy and drift of the clock's underlying oscillator.

This is an input to the IEEE 1588 Best Master Clock algorithm.

Remote Command: : LXI : CLOcK : PTP : ACCuracy
 NS25 | NS100 | NS250 | NS1000 | NS2500 | US10 | US25 | US100 | US250 | US
 1000 | US2500 | MS10 | MS25 | MS100 | MS1000 | S10 | GT10S | UNKNown
 : LXI : CLOCk : PTP : ACCuracy ?
Example: : LXI : CLOC : PTP : ACC US25
Range: NS25 | NS100 | NS250 | NS1000 | NS2500 | US10 | US25 | US100 | US2
 50 | US1000 | US2500 | MS10 | MS25 | MS100 | MS1000 | S10 | GT10S
 | UNKNown
Preset: Not affected by a Preset. The default value of "GT10S" can be
 restored by using the command:
 SYSTem : DEFault INPut
Instrument S/W Revision: A.01.60 or later

Announce Interval (Remote Only) Sets the time in seconds between PTP announce packets. A

shorter interval makes the system more responsive to changes in the master clock at the cost of network bandwidth and packet processing time. The announce interval should be constant across all the instruments in the network. The announce interval will be rounded to the nearest non-negative integer power of two, with a maximum value of 16.

Remote Command: : LXI: CLOcK: PTP: ANNounce: INTerval <interval>
 : LXI: CLOcK: PTP: ANNounce: INTerval?

Example: : LXI: CLOC: PTP: ANN: INT 1

Range: 1 | 2 | 4 | 8 | 16

Preset: Not affected by a Preset. The default value of "4" can be restored by using the command:
 SYSTem: DEFault INPut

Instrument S/W Revision: A.01.60 or later

Announce Receipt Time Out (Remote Only) Sets the number of announce intervals that the instrument waits to receive an announce packet while in the Slave or Listening. After this number of announce intervals, the instrument will transition to the Master state.

Remote Command: : LXI: CLOcK: PTP: ANNounce: RTOut <numberOfIntervals>
 : LXI: CLOcK: PTP: ANNounce: RTOut?

Example: : LXI: CLOC: PTP: ANN: RTO 5

Min: 2

Max: 10

Preset: Not affected by a Preset. The default value of "3" can be restored by using the command:
 SYSTem: DEFault INPut

Instrument S/W Revision: A.01.60 or later

Clock Class (Remote Only) Returns a ranking of master clock suitability relative to other clocks on the network. A lower value represents a more suitable clock.

Suitability is defined by the IEEE 1588 standard section 7.6.2.4

Remote Command: : LXI: CLOcK: PTP: CCLass?

Example: : LXI: CLOC: PTP: CCL?

Min: 6

Max: 248

Preset: Not affected by a Preset. The default value of "248" can be restored by using the command:
 SYSTem: DEFault INPut

Instrument S/W Revision: A.01.60 or later

Deviation (Remote Only) Returns the standard deviation of the instrument's PTP time from the Grandmaster's PTP time.

Remote Command: :LXI:CLOCK:PTP:DEVIation?

Example: :LXI:CLOC:PTP:DEV?

Instrument S/W Revision: A.01.60 or later

Domain (Remote Only) The instrument synchronizes its clock only with other clocks in the same domain.

Remote Command: :LXI:CLOCK:PTP:DOMain <domainNumber>
:LXI:CLOCK:PTP:DOMain?

Example: :LXI:CLOC:PTP:DOM 0

Min: 0

Max: 127

Preset: Not affected by a Preset. The default value of "0" can be restored by using the command:
SYSTem:DEFault INPut

Instrument S/W Revision: A.01.60 or later

Offset (Remote Only) Returns the difference between the instrument clock PTP time and the Master clock PTP time.

Remote Command: :LXI:CLOCK:PTP:OFFSet?

Example: :LXI:CLOC:PTP:OFFS?

Range: 0.0 to $-1.7976931348623157 \times 10^{308}$ s (Min Double)

Instrument S/W Revision: A.01.60 or later

First Priority (Remote Only) Setting this parameter overrides the IEEE 1588 Best Master Clock algorithm. If an instrument's First Priority parameter is smaller than all other clocks in its domain, it is chosen as the Master clock.

Remote Command: :LXI:CLOCK:PTP:PRIority:FIRSt <priority>
:LXI:CLOCK:PTP:PRIority:FIRSt?

Example: :LXI:CLOC:PTP:PRI:FIRS 50

Min: 0

Max: 255

Preset: Not affected by a Preset. The default value of "128" can be restored by using the command:
SYSTem:DEFault INPut

Instrument S/W Revision: A.01.60 or later

Second Priority (Remote Only) When two or more clocks are determined to be equally good by the Best Master Clock algorithm, the clock with the lowest Second Priority value is chosen to be the Master Clock.

Remote Command: :LXI:CLOCK:PTP:PRIOriTY:SECOnd <priority>
:LXI:CLOCK:PTP:PRIOriTY:SECOnd?

Example: :LXI:CLOC:PTP:PRI:SEC 50

Min: 0

Max: 255

Preset: Not affected by a Preset. The default value of "128" can be restored by using the command:
SYSTem:DEFault INPut

Instrument S/W Revision: A.01.60 or later

State (Remote Only) Returns the current state of the instrument's PTP clock as defined in the IEEE 1588 standard.

Remote Command: :LXI:CLOCK:PTP:STATe?

Example: :LXI:CLOC:PTP:STAT?

Range: INITializing | FAULty | DISabled | LISTening | PREMaster | MASTER | PASSive | UNCalibrated | SLAVE

Instrument S/W Revision: A.01.60 or later

Traceability (Remote Only) Returns the quality of the instrument's PTP clock source of time when chosen as the Grand Master clock.

This parameter is used by the Best Master Clock algorithm.

Remote Command: :LXI:CLOCK:PTP:TRACeability?

Example: :LXI:CLOC:PTP:TRAC?

Range: ATOMIC | GPS | RADio | PTP | NTP | HANDset | OTHer | OSCillator

Instrument S/W Revision: A.01.60 or later

Variance (Remote Only) Returns the variance of the instrument's PTP clock time relative to the

Master's PTP clock time.

Remote Command: :LXI:CLOCK:PTP:VARIance?
Example: :LXI:CLOC:PTP:VAR?
Range: 0.0 – 1.7976931348623157 x 10308 (Max Double)
Instrument S/W Revision: A.01.60 or later

Sync Interval (Remote Only) Sets the rate at which PTP sync packets are transmitted when this instrument is acting as a Master PTP clock. The values must be integer powers of 2.

Remote Command: :LXI:CLOCK:PTP:SINTerval <seconds>
Example: :LXI:CLOC:PTP:SINT 0.25s
Range: 0.0625s | 0.125s | 0.25s | 0.5s | 1s | 2s
Preset: Not affected by a Preset. The default value of "1" can be restored by using the command:
SYSTem:DEFault INPut
Instrument S/W Revision: A.01.60 or later

Remote Command: :LXI:CLOCK:PTP:SINTerval?
Example: :LXI:CLOC:PTP:SINT?
Range: 0.0625s | 0.125s | 0.25s | 0.5s | 1s | 2s
Preset: 1
Instrument S/W Revision: A.01.60 or later

Delay Request Interval (Remote Only) This property is used by the master clock to specify the interval between delay request packets sent from the slave to the master clock. Slaves use a randomly-chosen interval, with mean equal to this property.

The value for this parameter must be an integer power of two.

Remote Command: :LXI:CLOCK:PTP:DRINterval <seconds>
Example: :LXI:CLOC:PTP:DRIN 15 ms
Range: 1 s | 2 s | 4 s | 8 s | 16 s | 32 s
Preset: Not affected by a Preset. The default value of "8 s" can be restored by using the command:
SYSTem:DEFault INPut
Instrument S/W Revision: A.01.60 or later

Remote Command: :LXI:CLOCK:PTP:DRINterval?

Example: :LXI:CLOC:PTP:DRIN 15 ms
 Min: 0.0 s
 Max: $2^{32} = 4294967296$ s
 Preset: 8 s
 Instrument S/W Revision: A.01.60 or later

Grand Master Accuracy (Remote Only) Returns the relative accuracy of the Grand Master clock.

Remote Command: :LXI:CLOCK:PTP:GMASter:ACCuracy?
 Example: :LXI:CLOC:PTP:GMAS:ACC? For example, this might return GT10S.
 Range: 25NS | 100NS | 250NS | 1US | 2.5US | 10US | 25US | 100US | 250US | 1MS | 2.5MS | 10MS | 25MS | 100MS | 1S | 10S | GT10S | UNKNown
 Instrument S/W Revision: A.01.60 or later

MAC Address (Remote Only) Returns the Grand Master's MAC Address.

Remote Command: :LXI:CLOCK:PTP:GMASter:MADDress?
 Example: :LXI:CLOC:PTP:GMAS:MADD? For example, this might return "00-00-50-1e-ca-ad".
 Range: Uppercase, Lowercase, Numeric, Symbol
 Instrument S/W Revision: A.01.60 or later

Traceability (Remote Only) Describes the quality of the Grand Master PTP clock's source of time.

Remote Command: :LXI:CLOCK:PTP:GMASter:TRACeability?
 Example: :LXI:CLOC:PTP:GMAS:TRAC? For example, this might return OSC.
 Range: ATOMic | GPS | RADio | PTP | NTP | HANDset | OTHer | OSCillator
 Instrument S/W Revision: A.01.60 or later

Master MAC Address (Remote Only) Returns the Master's MAC Address.

Remote Command: :LXI:CLOCK:PTP:MASter:MADDress?
 Example: :LXI:CLOC:PTP:MASt:MADD?
 Range: Uppercase, Lowercase, Numeric, Symbol
 Instrument S/W Revision: A.01.60 or later

Servo Algorithm (Remote Only) The Servo Algorithm parameters are considered advanced settings for tweaking IEEE 1588 performance.

Log (Remote Only) The Servo Log records measurements of the offset between the instrument's PTP clock and the Master's PTP clock. It also records the packet travel time for Master-to-Slave and Slave-to-Master transactions.

Next (Remote Only) Retrieves and removes the oldest entry from the Servo Log. The format for a servo log entry is as follows

Sample Index:	integer representing entry order
Time Seconds:	seconds portion of the entry timestamp
Time Fraction:	sub-second portion of the entry timestamp
Offset Seconds:	offset between the instrument's PTP clock and the Master's PTP clock
Average Delay Seconds:	the average measured transmission delay
Master Delay Seconds:	Master-to-Slave packet travel time
Slave Delay Seconds:	Slave-to-Master packet travel time
Remote Command:	:LXI:CLOCK:SALgorithm:LOG[:NEXT]?
Example:	:LXI:CLOC:SALG:LOG?
Range:	Uppercase, Lowercase, Numeric, Symbol
Instrument S/W Revision:	A.01.60 or later

Circular (Remote Only) Sets the behavior for entries occurring while the Servo Log is full.

- If Circular is set to 1, incoming events overwrite the oldest events in the log.
- If Circular is set to 0, incoming events are discarded.

Remote Command:	:LXI:CLOCK:SALgorithm:LOG:CIRCular[:ENABled] ON OFF 0 1 :LXI:CLOCK:SALgorithm:LOG:CIRCular[:ENABled]?
Example:	:LXI:CLOC:SALG:LOG:CIRC 1
Range:	ON OFF 0 1
Preset:	Not affected by a Preset. The default value of "1" can be restored by using the command: SYSTem:DEFault INPut
Instrument S/W Revision:	A.01.60 or later

Beginning Entry (Remote Only) Sets or freezes the beginning entry of the log when in circular mode to the most recently added entry at the time of the command. This is so that the :LXI:EVENT:LOG:ENTry? command has a reference entry for indexing individual entries in the

log.

Remote Command: :LXI:CLOCK:SALGORITHM:LOG:CIRCULAR:FBENTRY
 Example: LXI:CLOCK:SALG:LOG:CIRC:FBEN
 Instrument S/W Revision: A.01.60 or later

Clear (Remote Only) Clears all entries from the Servo Log.

Remote Command: :LXI:CLOCK:SALGORITHM:LOG:CLEAR
 Example: :LXI:CLOC:SALG:LOG:CLE
 Instrument S/W Revision: A.01.60 or later

Count (Remote Only) Returns the number of unread entries in the Servo Log.

Remote Command: :LXI:CLOCK:SALGORITHM:LOG:COUNT?
 Example: :LXI:CLOC:SALG:LOG:COUN?
 Range: 0 - IEEE 1588 Servo Log Size
 Instrument S/W Revision: A.01.60 or later

Enabled (Remote Only) • When the Servo Log is disabled, no events are recorded.

- When it is enabled, the Servo Log is active.
-

Remote Command: :LXI:CLOCK:SALGORITHM:LOG:ENABLED ON|OFF|0|1
 :LXI:CLOCK:SALGORITHM:LOG:ENABLED?
 Example: :LXI:CLOC:SALG:LOG:ENAB 1
 Range: ON|OFF|0|1
 Preset: Not affected by a Preset. The default value of "0" can be restored by using the command:
 SYSTem:DEFault INPut
 Instrument S/W Revision: A.01.60 or later

Size (Remote Only) Sets the maximum number of entries to store in the Servo Log.

Remote Command: :LXI:CLOCK:SALGORITHM:LOG:SIZE <maxLogEntries>
 :LXI:CLOCK:SALGORITHM:LOG:SIZE?
 Example: :LXI:CLOC:SALG:LOG:SIZE 100
 Min: 0

Max: 1024
Preset: Not affected by a Preset. The default value of "256" can be restored by using the command:
SYSTem:DEFault INPut
Instrument S/W Revision: A.01.60 or later

All (Remote Only) Non-destructively returns the entire contents of the Servo Log.

Remote Command: :LXI:CLOCK:SALGorithm:LOG:ALL?
Example: :LXI:CLOC:SALG:LOG?
Range: Uppercase, Lowercase, Numeric, Symbol
Instrument S/W Revision: A.01.60 or later

Specific Entry (Remote Only) Non-destructively returns a specifically indexed entry from within the Servo Log.

Remote Command: :LXI:CLOCK:SALGorithm:LOG:ENTRy? <intIndex>
Example: :LXI:CLOC:SALG:LOG? 0 Returns the oldest entry in the Servo Log. Example of result :
"1,1208978798,139644871,0.000000000,3.393600e+038,0.00000000
0,0.000000000,0.000000000"
Range: Uppercase, Lowercase, Numeric, Symbol
Instrument S/W Revision: A.01.60 or later

Statistics (Remote Only) Returns the long-term statistics of the servo log that characterizes the performance of the instrument PTP clock's offset from the master PTP clock. The statistics include the following values:

- Number of samples (an integer)
- Mean offset (a double)
- Standard deviation of the offset (a double)
- Maximum offset (a double)
- Minimum offset (a double)

Remote Command: :LXI:CLOCK:SALGorithm:LOG:STATistics[:DATA]?
Example: :LXI:CLOC:SALG:LOG:STAT? Example of result :
"3643,0.000000000,0.000000000,0.000000000,0.000000000"
Instrument S/W Revision: A.01.60 or later

Clear Statistics (Remote Only) Resets the long-term servo performance statistics.

Remote Command: : LXI: CLOCk: SALGorithm: LOG: STATistics: CLear
 Example: : LXI: CLOC: SALG: LOG: STAT? Example of result :
 "3643,0.000000000,0.000000000,0.000000000,0.000000000"
 Instrument S/W Revision: A.01.60 or later

Asymmetry (Remote Only) Sets the difference in seconds between the Master-to-Slave packet travel time and the Slave-to-Master packet travel time.

Remote Command: : LXI: CLOCk: SALGorithm[:SET]: ASYMmetry <seconds>
 : LXI: CLOCk: SALGorithm[:SET]: ASYMmetry?
 Example: : LXI: CLOC: SALG: ASYM 15 ns
 Min: -1
 Max: 1
 Preset: Not affected by a Preset. The default value of "0.0 s " can be
 restored by using the command:
 SYSTem: DEFault INPut
 Instrument S/W Revision: A.01.60 or later

Coarse/Fine Threshold (Remote Only) Determines when the PTP clock Servo algorithm uses the 'Fine' or 'Coarse' parameters for adjusting the instrument's PTP clock time. The threshold is measured against a running estimate of the servo variance.

Coarse mode causes a slave clock to converge with the master clock more quickly, but it is more sensitive to noise, while Fine mode filters out noise more effectively, but takes longer to converge.

Remote Command: : LXI: CLOCk: SALGorithm[:SET]: CFTHreshold
 <secondsSquared>
 : LXI: CLOCk: SALGorithm[:SET]: CFTHreshold?
 Example: : LXI: CLOC: SALG: CFTH 0.25
 Min: 0
 Max: 1
 Preset: Not affected by a Preset. The default value of "1.0e-11 " can be
 restored by using the command:
 SYSTem: DEFault INPut
 Instrument S/W Revision: A.01.60 or later

Coarse Proportional Constant (Remote Only) This constant is used by the servo when above the Coarse/Fine Threshold variance. Decreasing this constant causes the servo to become less responsive to both noise in the system and changes in the Master Clock's rate. Conversely,

increasing this constant causes the servo to respond more energetically to both system noise and changes in the Master Clock's rate.

The ratio between the Proportional and Integral constants should remain roughly constant.

Remote Command: : LXI:CLock:SALGorithm[:SET]:CPConstant <servoConstant>
 : LXI:CLock:SALGorithm[:SET]:CPConstant?

Example: : LXI:CLOC:SALG:CPC 0.5

Min: 0

Max: 1

Preset: Not affected by a Preset. The default value of "0.4 " can be restored
 by using the command:
 SYSTem:DEFault INPut

Instrument S/W Revision: A.01.60 or later

Coarse Integral Constant (Remote Only) This constant is used by the servo when above the Coarse/Fine Threshold variance. Decreasing this constant causes the servo to become less responsive to both noise in the system and changes in the Master Clock's rate. Conversely, increasing this constant causes the servo to respond more energetically to both system noise and changes in the Master Clock's rate.

The ratio between the Proportional and Integral constants should remain roughly constant.

Remote Command: : LXI:CLock:SALGorithm[:SET]:CICConstant <servoConstant>
 : LXI:CLock:SALGorithm[:SET]:CICConstant?

Example: : LXI:CLOC:SALG:CIC 0.5

Min: 0

Max: 1

Preset: Not affected by a Preset. The default value of "0.2 " can be restored
 by using the command:
 SYSTem:DEFault INPut

Instrument S/W Revision: A.01.60 or later

Fine Proportional Constant (Remote Only) This constant is used by the servo when below the Coarse/Fine Threshold variance. Decreasing this constant causes the servo to become less responsive to both noise in the system and changes in the Master Clock's rate. Conversely, increasing this constant causes the servo to respond more energetically to both system noise and changes in the Master Clock's rate.

The ratio between the Proportional and Integral constants should remain roughly constant.

Remote Command: : LXI:CLock:SALGorithm[:SET]:FPConstant <servoConstant>
 : LXI:CLock:SALGorithm[:SET]:FPConstant?

Example: : LXI:CLOC:SALG:FPC 1

Min: 0

Max: 1

Preset: Not affected by a Preset. The default value of "0.35 " can be restored by using the command:
 SYSTem:DEFault INPut

Instrument S/W Revision: A.01.60 or later

Fine Integral Constant (Remote Only) This constant is used by the servo when below the Coarse/Fine Threshold variance. Decreasing this constant causes the servo to become less responsive to both noise in the system and changes in the Master Clock's rate. Conversely, increasing this constant causes the servo to respond more energetically to both system noise and changes in the Master Clock's rate.

The ratio between the Proportional and Integral constants should remain roughly constant.

Remote Command: : LXI:CLOCK:SALGorithm[:SET]:FIConstant <servoConstant>
 : LXI:CLOCK:SALGorithm[:SET]:FIConstant?

Example: : LXI:CLOC:SALG:FIC 0.6

Min: 0

Max: 1

Preset: Not affected by a Preset. The default value of "0.05" can be restored by using the command:
 SYSTem:DEFault INPut

Instrument S/W Revision: A.01.60 or later

Maximum Outlier Discard Count (Remote Only) Sets the maximum number of outlier packets to ignore. After this maximum is exceeded, the next packet is accepted, regardless of whether or not it is flagged as an outlier.

Remote Command: : LXI:CLOCK:SALGorithm[:SET]:OMAXimum
 <consecutiveSamples>
 : LXI:CLOCK:SALGorithm[:SET]:OMAXimum?

Example: : LXI:CLOC:SALG:OMAX 3

Min: 0

Max: 25

Preset: Not affected by a Preset. The default value of "5" can be restored by using the command:
 SYSTem:DEFault INPut

Instrument S/W Revision: A.01.60 or later

Preset: Not affected by a Preset. The default value of "0.1 s " can be restored by using the command:
SYSTem:DEFault INPut

Instrument S/W Revision: A.01.60 or later

Configure (Remote Only) Allows the configuration of some of the above parameters from a single SCPI command.

Remote Command: :LXI:CLOCK:SALGorithm[:SET]:CONFigure <asymmetry>, <coarse fine threshold>, <cpc>, <cic>, <fpc>, <fic>, <maximum outlier discard>, <outlier threshold>, <set/steer threshold>

Example: :LXI:CLOC:SALG:CONF 0.0, 2.0E-13, 0.4, 0.2, 0.35, 0.05, 5, 2.0E-4, 0.1s

Instrument S/W Revision: A.01.60 or later

Synchronization (Remote Only) Master (Remote Only) Reports whether or not the device has been selected as the PTP master clock.

Remote Command: :LXI:CLOCK:SYNC:MASTer?

Example: :LXI:CLOC:SYNC:MAST?

Range: ON | OFF | 0 | 1

Instrument S/W Revision: A.01.60 or later

Local Enabled (Remote Only) Enable steering of the local clock with the PTP IEEE 1588 clock.

Remote Command: :LXI:CLOCK:SYNC:LOCAL:ENABLEd ON|OFF|0|1
:LXI:CLOCK:SYNC:LOCAL:ENABLEd?

Example: :LXI:CLOC:SYNC:LOC:ENAB ON

Range: ON | OFF | 0 | 1

Preset: Not affected by a Preset. The default value of "ON" can be restored by using the command:
SYSTem:DEFault INPut

Instrument S/W Revision: A.01.60 or later

Local Interval (Remote Only) The local clock is updated after the time set in the Local Interval elapses.

Remote Command: :LXI:CLOCK:SYNC:LOCAL:INTERval
:LXI:CLOCK:SYNC:LOCAL:INTERval?

Example: :LXI:CLOC:SYNC:LOC:INT 60
Min: 0
Max: 3600
Preset: Not affected by a Preset. The default value of "60 " can be restored by using the command:
SYSTem:DEFault INPut
Instrument S/W Revision: A.01.60 or later

Instrument Status Events

Enable (Remote Only) Setting the enabled parameter to ON enables the selected instrument event to be used as a source for Output LAN Events. Enabling an Instrument Status Event also causes the event to appear in the Event Log.

Remote Command: :LXI:EVENT:STATus[:ENABled] "STATUSEVENT",ON|OFF|1|0
Example: :LXI:EVENT:STAT "WaitingForTrigger",1
Preset: Not affected by a Preset. The default value of "1" can be restored by using the command, :SYSTem:DEFault INPut.
State Saved: Saved in instrument state.
Range: 1|0|ON|OFF
Instrument S/W Revision: A.01.60 or later

Remote Command: :LXI:EVENT:STATus[:ENABled]? "STATUSEVENT"
Example: :LXI:EVENT:STAT? "WaitingForTrigger"
Returns 1 if previously enabled. Otherwise, returns 0.
Preset: ON
State Saved: Saved in instrument state.
Range: 1|0|ON|OFF
Instrument S/W Revision: A.01.60 or later

LXI State Recall

Location (Remote Only) This parameter is used to store the file paths of the state files to be recalled when each Input LAN Event is received. Since each LAN Event has its own Location entry, a given state is capable of branching to at least 8 different states. If custom Input events are added, an even greater branching factor is possible.

When setting up state transitions, it is important to set the location of the next state before saving. This way, when the saved state is recalled, the next state locations are also

automatically recalled.

Remote Command: :LXI:EVENT:INPut:LAN:LOCation "LANEVENT", "path"
 Example: :LXI:EVEN:INP:LAN:LOC "LANEVENT", "c:\states\state01.state"
 State Saved: Saved in instrument state.
 Range: Uppercase, Lowercase, Numeric, Symbol
 Restriction and Notes: The maximum length of the string is 512 characters.
 Instrument S/W Revision: A.01.60 or later

Remote Command: :LXI:EVENT:INPut:LAN:LOCation? "LANEVENT"
 Example: :LXI:EVEN:INP:LAN:LOC? "LANEVENT"
 Returns "c:\states\state01.state" if that value was previously entered
 State Saved: Saved in instrument state.
 Range: Uppercase, Lowercase, Numeric, Symbol
 Restriction and Notes: The maximum length of the string is 512 characters.
 Instrument S/W Revision: A.01.60 or later

Disable All (Remote Only) Causes all LXI Input LAN Events to go into the disabled state (Enabled = OFF).

Remote Command: :LXI:EVENT:INPut:LAN:DISable:ALL
 Example: :LXI:EVEN:INP:LAN:DIS:ALL
 Instrument S/W Revision: A.01.60 or later

Add (Remote Only) Adds the provided string to the list of possible LAN events to Input as a response to instrument events. As new LAN events are added, keys are generated in the LXI Input LAN Events menu. New key panels are generated as the number of possible LAN events increases past a multiple of six, and the "More" keys are updated to reflect the new number of key panels in the LXI Input LAN Events menu.

Remote Command: :LXI:EVENT:INPut:LAN:ADD "LANEVENT"
 Example: :LXI:EVEN:INP:LAN:ADD "LANEVENT"
 State Saved: No
 Range: Uppercase, Lowercase, Numeric, Symbol except for comma or semicolon

Restriction and Notes: The maximum length of the string is 16 characters.
Longer strings are concatenated and added to the LXI Input LAN Event list.
No event is added if the LAN Event already exists.

Instrument S/W Revision: A.01.60 or later

Remove (Remote Only) Removes the provided string from the list of LXI Input LAN Events. As new LAN events are removed, keys are removed from the LXI Input LAN Events menu. Key panels are removed as the number of possible LAN events decreases past a multiple of six, and the “More” keys are updated to reflect the new number of key panels in the LXI Input LAN Events menu. Events from the default list cannot be removed.

Remote Command: : LXI : EVENT : INPut : LAN : REMove [: EVENT] "LANEVENT"
Example: : LXI : EVEN : INP : LAN : REM "LANEVENT"
State Saved: No
Range: Uppercase, Lowercase, Numeric, Symbol
Restriction and Notes: The maximum length of the string is 16 characters.
Longer strings are concatenated and the resulting LAN Event is removed from the LXI Input LAN Event list.
Nothing happens if the LAN event was not introduced using the Add command.

Instrument S/W Revision: A.01.60 or later

Remove All (Remote Only) Clears the list of custom LAN events (those introduced using the Add command). As new LAN events are removed, keys are removed from the LXI Input LAN Events menu. Key panels are removed as the number of possible LAN events decreases past a multiple of six, and the “More” keys are updated to reflect the new number of key panels in the LXI Input LAN Events menu.

Remote Command: : LXI : EVENT : INPut : LAN : REMove : ALL
Example: : LXI : EVEN : INP : LAN : REM : ALL
Restriction and Notes: Only LAN Events added with the Add command are removed.
Default events cannot be removed.

Instrument S/W Revision: A.01.60 or later

Filter (Remote Only) Only LXI Input LAN Events coming from hosts matching the filter string are processed. There is no front panel access to this command

The syntax for specifying a filter is as follows:

Filter == ([host[:port]] | [ALL[:port]]) [,Filter]

Specifying an empty string means that LXI trigger packets are accepted as an Input from

any port on any host on the network via either TCP or UDP.

Specifying only the port means that any host communicating over that port can send events.

Specifying ALL indicates that UDP multicast packets are accepted if they are directed to the IANA assigned multicast address on the IANA assigned default port, or the designated port if specified.

Examples:

- “192.168.0.1:23”
- “agilent.com, soco.agilent.com”
- “agilent.com:80, 192.168.0.1”

Remote Command:	:LXI:EVENT:INPut:LAN:FILTer "LANEVENT", "filterString" :LXI:EVENT:INPut:LAN:FILTer?
Example:	:LXI:EVEN:INP:LAN:FILT "LAN0", "agilent.com" :LXI:EVEN:INP:LAN:FILT?
State Saved:	Saved in instrument state.
Range:	Uppercase, Lowercase, Numeric, Symbol
Restriction and Notes:	The maximum length of the string is 45 characters. Nothing happens if the LAN event does not exist.
Instrument S/W Revision:	A.01.60 or later

Identifier (Remote Only) Sets the string that is expected to arrive over the LAN for a given Input LAN Event to occur. The Identifier is variable to allow for easier system debugging.

Remote Command:	:LXI:EVENT:INPut:LAN:IDENtifier "LANEVENT", "identifier" :LXI:EVENT:INPut:LAN:IDENtifier? "LANEVENT"
Example:	:LXI:EVEN:INP:LAN:IDEN "LAN0", "debugstring"
State Saved:	Saved in instrument state.
Range:	Uppercase, Lowercase, Numeric, Symbol
Restriction and Notes:	The maximum length of the string is 16 characters. Nothing happens if the LAN event does not exist. The default value is that the identifier is equivalent to the name of the LAN Event.
Instrument S/W Revision:	A.01.60 or later

Detection (Remote Only) Pressing this button brings up the Detection menu.

- Selecting “Rise” causes the instrument to trigger on the receipt of a signal low LAN

Event followed by a signal high LAN Event.

- Selecting “Fall” causes the instrument to trigger on the receipt of a signal high LAN Event followed by a signal low LAN Event.
- Selecting “High” causes the instrument to trigger on every signal high LAN Event.
- Selecting “Low” causes the instrument to trigger on every signal low LAN Event.

Remote Command: : LXI:EVENT:INPut:LAN[:SET]:DETEction "LANEVENT",
HIGH|LOW|RISE|FALL

Example: : LXI:EVENT:INP:LAN:DET "LANEVENT",HIGH

Preset: Not affected by a Preset. The default value of "HIGH" can be
restored by using the remote command:
:SYSTem:DEFault INPut

State Saved: Saved in instrument state.

Range: HIGH | LOW | RISE | FALL

Restriction and Notes: If a non existent LAN event is passed in the lanEvent argument,
the command is ignored

Instrument S/W Revision: A.01.60 or later

Remote Command: : LXI:EVENT:INPut:LAN[:SET]:DETEction? "LANEVENT"

Example: : LXI:EVENT:INP:LAN:DET? "LANEVENT"

Preset: HIGH

State Saved: Saved in instrument state.

Range: HIGH | LOW | RISE | FALL

Restriction and Notes: If a non existent LAN event is passed in the lanEvent argument,
the command is ignored

Instrument S/W Revision: A.01.60 or later

Enabled (Remote Only) When the Enabled parameter is set to ON, receiving the given LAN Event causes the instrument to transition to the state held in the Next State Slot.

When the Enabled parameter is OFF, the Input LAN Event is ignored.

Remote Command: : LXI:EVENT:INPut:LAN[:SET]:ENABled
"LANEVENT",ON|OFF|1|0

Example: : LXI:EVENT:INP:LAN:ENAB "LAN0",1

Preset: Not affected by a Preset. The default value of "OFF" can be restored
by using the remote command:
:SYSTem:DEFault INPut

State Saved: Saved in instrument state.
 Range: 1|0
 Instrument S/W Revision: A.01.60 or later

Remote Command: :LXI:EVENT:INPut:LAN[:SET]:ENABled? "LANEVENT"
 Example: :LXI:EVEN:INP:LAN:ENAB? "LAN0"
 Preset: OFF
 State Saved: Saved in instrument state.
 Range: 1|0
 Instrument S/W Revision: A.01.60 or later

Count (Remote Only) Returns the number of items in the LXI Input LAN Event List.

Remote Command: :LXI:EVENT:INPut:LAN:COUNT?
 Example: :LXI:EVEN:INP:LAN:COUN?
 Instrument S/W Revision: A.01.60 or later

List (Remote Only) Returns a list of all of the valid LXI Input LAN Event names.

Remote Command: :LXI:EVENT:INPut:LAN:LIST?
 Example: :LXI:EVEN:INP:LAN:LIST?
 Returns "LAN0", "LAN1", "LAN2", "LAN3", "LAN4", "LAN5",
 "LAN6", "LAN7"
 Preset: "LAN0", "LAN1", "LAN2", "LAN3", "LAN4", "LAN5", "LAN6",
 "LAN7"
 State Saved: Saved in instrument state.
 Instrument S/W Revision: A.01.60 or later

Configure (Remote Only) Allows the configuration of some of the above parameters from a single SCPI command.

Remote Command: :LXI:EVENT:INPut:LAN[:SET]:CONFigure "lanEvent",
 <enab>, <detection>, <filter>, <identifier>
 Example: :LXI:EVEN:INP:LAN:CONF "LAN0",1,FALL,"FILTER","DEBUG"
 Instrument S/W Revision: A.01.60 or later

Restore Defaults

Provides incremental initialization of the system setting groups along with supporting a

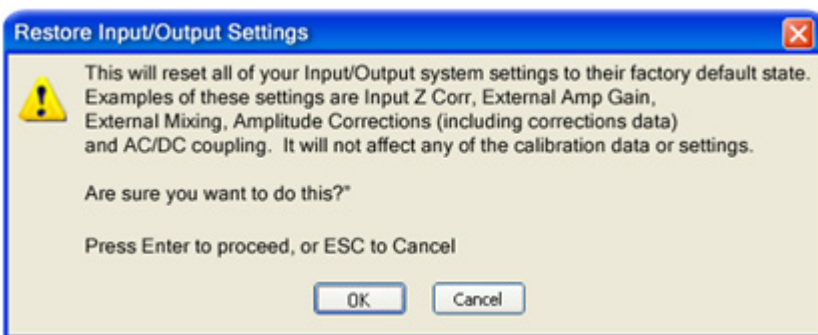
comprehensive reset of the entire instrument back to a factory default state. The menu selections are the groups of system settings and when one is selected, that particular group of system settings is reset back to their default values.

Remote Command	:SYSTem:DEFault [ALL] ALIGn INPut MISc MODes PON
Example	SYST:DEF
Key Path	System
Mode	All
State Saved	No
Instrument S/W Revision	A.01.60 or later

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:

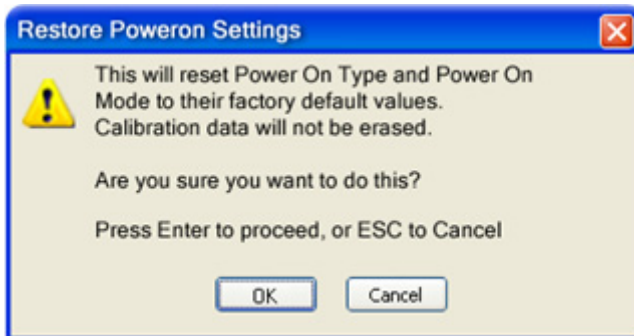


Key Path	System, Restore System Defaults
Example	:SYST:DEF INP
Instrument S/W Revision	A.01.60 or later

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 Mode reset to whatever the factory set as its default value.

Confirmation is required to restore the factory default values. The confirmation dialog is:



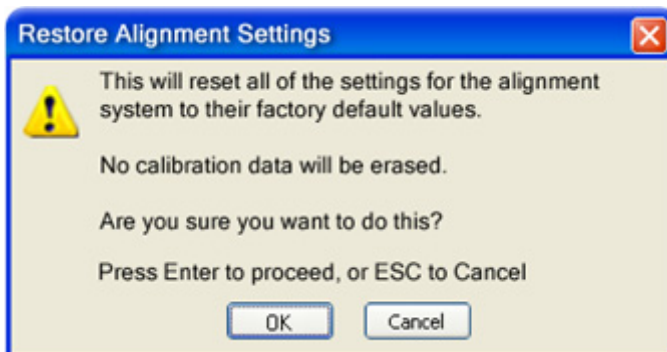
Key Path	System, Restore System Defaults
Example	:SYST:DEF PON
Instrument S/W Revision	A.01.60 or later

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:



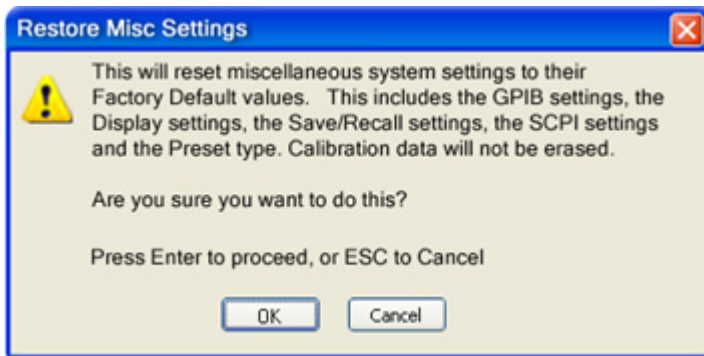
Key Path	System, Restore System Defaults
Example	:SYST:DEF ALIG
Instrument S/W Revision	A.01.60 or later

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
GPIB Address	18
Auto File Name Number	000
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
Display Intensity	100
Display Backlight	ON
Display Theme	TDColor
System Annotation	ON
The SYST:PRES:TYPE	MODE

Confirmation is required to restore the factory default values. The confirmation dialog is:

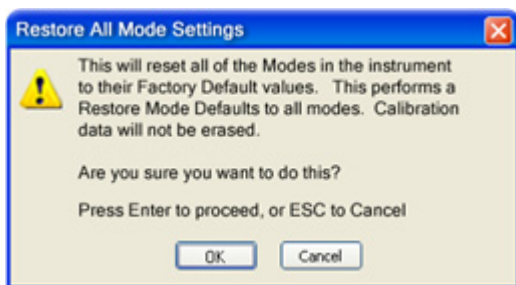


Key Path	System, Restore System Defaults
Example	:SYST:DEF MISC
Instrument S/W Revision	A.01.60 or later

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:



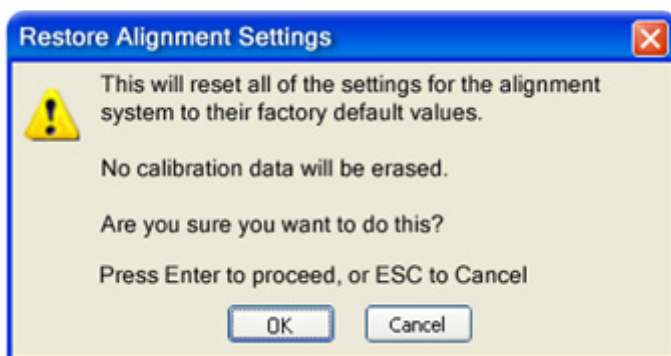
Key Path	System, Restore System Defaults
Dependencies/Couplings	An All Mode will cause the currently running measurement to be aborted, mode switch to the power-on mode and activate the default measurement for the power-on mode. It gets the mode to a consistent state with all of the default couplings set.

Example :SYST:DEF MOD
Instrument S/W Revision A.01.60 or later

All

This is the catastrophic function that does 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:



Key Path **System, Restore System Defaults**

Dependencies/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.

Example :SYST:DEF ALL

Instrument S/W Revision A.01.60 or later

Control Panel...

Opens the Windows Control Panel.

Pressing any key will cause the Control Panel to exit.

Key Path **System**

Remote Command Notes No remote command for this key.

Instrument S/W Revision A.01.60 or later

Licensing...

Opens the license explorer.

For Help on this key, select Help in the menu bar at the top of the license explorer window.

Key Path	System
Remote Command Notes	No equivalent remote command for this key.
Instrument S/W Revision	A.01.60 or later

There are five remote commands available for licensing.

Remote Command:	:SYSTem:LKEY <"OptionInfo">, <"LicenseInfo">
Remote Command Notes:	<p>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.</p> <p>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 backward compatibility.</p>
Example:	<pre>SYST:LKEY "N9073A-1FP",027253AD27F83CDA5673A9BA5F427FDA5E4F25 AEB1017638211AC9F60D9C639FE539735909C551DE0A91"</pre>
Instrument S/W Revision:	A.01.60 or later
Remote Command:	:SYSTem:LKEY:DELeTe <"OptionInfo">,<"LicenseInfo">
Remote Command Notes:	<p>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.</p> <p>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 backward compatibility.</p>
Example:	<pre>SYST:LKEY:DEL "N9073A-1FP",027253AD27F83CDA5673A9BA5F427FDA5E4F2 5AEB1017638211AC9F60D9C639FE539735909C551DE0A91"</pre>
Instrument S/W Revision:	A.01.60 or later

System Functions
System

Remote Command: :SYSTem:LKEY:LIST?

Remote Command 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

Instrument S/W Revision: A.01.60 or later

Remote Command: :SYSTem:LKEY? <"OptionInfo">

Remote Command 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"

Example: SYST:LKEY? "N9073A-1FP"

Instrument S/W Revision: A.01.60 or later

Remote Command: :SYSTem:HID?

Remote Command Notes: Return value is the host ID as a string

Instrument S/W Revision: A.01.60 or later

Service

Accesses capabilities performed in the factory or under instructions from repair procedures. This menu key is only visible when the logged-in user is “advanceduser” or “saservice”. The first access to the Service Menu after invoking the instrument application will require an authentication Service Code.

Key Path	System
Instrument S/W Revision	A.01.60 or later

Diagnostics

The Diagnostics key in the System menu gives you access to basic diagnostic capabilities of the instrument.

Key Path	System, More
Instrument S/W Revision	A.01.60 or later

Show Hardware Statistics

Provides a display of various hardware statistics. The statistics include the following:

Mechanical relay cycles

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.

System Functions
System

Std Header	Product Number: N9020A	
	Serial Number: US46340924	
	Firmware Revision: A.01.01	
Mechanical relays	Calibrator Switch Cycles:	1800
	AC/DC Switch Cycles:	60
	2 dB #1 Mechanical Atten Cycles	23489
	2 dB #2 Mechanical Atten Cycles	23400
	6 dB Mechanical Atten Cycles	500000
	10 dB Mechanical Atten Cycles	1000000
	20 dB Mechanical Atten Cycles	2500
Odometer	30 dB Mechanical Atten Cycles	60000
		4339
	High operating temperature extreme:	+37.2degC
	Low operating temperature extreme	+18.1degC
	Elapsed Time (ontime) (hours):	1600

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.

Restriction and Notes The values displayed on the screen are only updated upon entry to the screen and not updated while the screen is being displayed.

Key Path **System, Diagnostics**

Mode All

Instrument S/W Revision A.01.60 or later

Query the Mechanical Relay Cycle Count Returns the count of mechanical relay cycles.

Remote Command: :SYSTem:MRELAY:COUNT?

Remote Command Notes: Query Only

Restriction and Notes: The return value is a comma separated list of the individual counts for each mechanical relay.

The position of the relays in the list is:

“<Cal Signal>,<AC/DC>,<2dB #1 Atten>,<2dB #2 Atten>,<6dB Atten>,<10dB Atten>,<20dB Atten>,<30dB Atten>”

Example: :SYST:MREL:COUN?

Instrument S/W Revision: A.01.60 or later

Query the Operating Temperature Extremes Returns the low operating temperature extreme value. The value survives a power-cycle and is the temperature extreme encountered since the value was reset by the factory or service center.

Mode All

Remote Command :SYSTem:TEMPerature:LEXTreme?

Restriction and Notes Value is in degrees Celsius at which the lowest operating temperature has been recorded since 1st power-up.

State Saved No

Example :SYST:TEMP:LEXT?

Instrument S/W Revision A.01.60 or later

Returns the high operating temperature extreme value. The value survives a power-cycle and is the temperature extreme encountered since the value was reset by the factory or service center.

Mode All

Remote Command :SYSTem:TEMPerature:HEXTreme?

Restriction and Notes Value is in degrees Celsius at which the highest operating temperature has been recorded since 1st power-up.

State Saved No

Example :SYST:TEMP:HEXT?

Instrument S/W Revision A.01.60 or later

Query the Elapsed Time since 1st power on Returns the elapsed on-time in minutes since 1st power-on.

Remote Command: :SYSTem:PON:ETIMe?

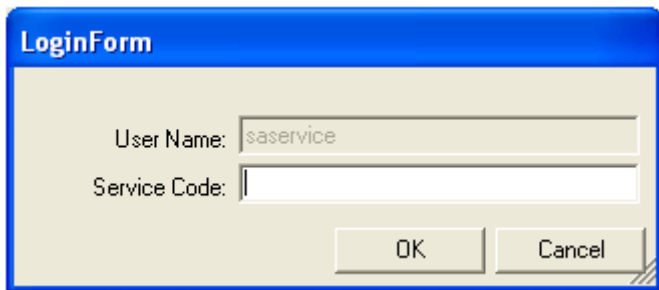
Remote Command Notes: Query Only

Example: :SYST:PON:ETIM?

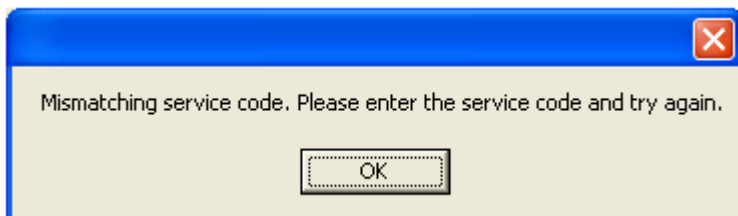
Instrument S/W Revision: A.01.60 or later

Advanced

Accesses advanced diagnostic capabilities performed in the factory or under instructions from repair procedures. This menu key is only visible when the logged-in user is “saservice”. The first access to the Advanced Diagnostic Menu after invoking the instrument application will require an authentication, which is to enter the Service Code. Subsequent accesses to the Advanced Diagnostic Menu are unimpeded. The Authentication dialog looks like:



“OK” is the default key thus the Enter key is used to complete the entry. If invalid Service Code is entered authentication is not granted and the user is provided the following dialog:



Key Path	System, Diagnostics
Restriction and Notes	Password is required to access this menu.
Instrument S/W Revision	A.01.60 or later

List installed Options (Remote Command Only)

Lists the installed options that pertain to the instrument (signal analyzer).

Mode	All
Remote Command	:SYSTem:OPTions?
Restriction and 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
Example	:SYST:OPT?
Instrument S/W Revision	A.01.60 or later

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?
Preset	Initialized to OFF at startup, unaffected by Preset
State Saved	No
Remote Command Notes	Keyboard lock remains in effect until turned-off or the instrument is power-cycled
Example	:SYST:KLOC ON
Instrument S/W Revision	A.01.60 or later

List SCPI Commands (Remote Command Only)

Outputs a list of the valid SCPI commands for the currently selected Mode.

Remote Command:	:SYSTem:HELP:HEADers?
Remote Command Notes:	The output is an IEEE Block format with each command separated with the New-Line character (hex 0x0A)
Example:	:SYST:HELP:HEAD?
Instrument S/W Revision:	A.01.60 or later

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?
Instrument S/W Revision: A.01.60 or later

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?
Remote Command 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
Example :SYST:DATE "2006,05,26"
Instrument S/W Revision A.01.60 or later

Time (Remote Command Only)

Sets or queries the time in the instrument.

Mode All
Remote Command :SYSTem:TIME "<hour>,<minute>,<second>"
 :SYSTem:TIME?
Remote Command 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
Example :SYST:TIME "13,05,26"
Instrument S/W Revision A.01.60 or later

User Preset

The User Preset key opens up a menu that gives you three choices – execute the **User Preset** by pressing the **User Preset** key, User Preset all of the modes in the analyzer by pressing the **User Preset All Modes** key, and save the current state for the current mode by pressing the **Save User Preset** key.

Instrument S/W A.01.60 or later
Revision

User Preset

User Preset behaves similarly to **Recall State** in that it recalls a hidden Save State file. However, since each Mode has its own **User Preset** file, **User Preset** will never cause a mode switch, whereas recalling a Save State file may cause a mode switch, if the Save State file was saved while in a different mode.

The User Preset file is a Save State file. **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`. So for any given Mode, the only way to perform a User Preset is from that Mode, not from any other Mode. The user has no control over the user preset filename and has no direct access to the user preset file.

User Preset recalls a mode's state which includes all of the variables affected by doing a Mode Preset. It not only recalls Mode Preset settings, but it also recalls all of the mode persistent settings. User Preset also recalls all of the Input/Output system settings 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, so 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.

User Preset 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
Dependencies/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.
Restriction and Notes	Clears all pending OPC bits. The Status Byte is set to 0.
Remote Command Notes	:SYST:PRES:USER:SAVE is used to save the current state as the user preset state.
Example	:SYST:PRES:USER:SAVE :SYST:PRES:USER
Instrument S/W Revision	A.01.60 or later

User Preset All Modes

User Preset All Modes behaves similarly to Power On User Preset, since it 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.

User Preset 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

Dependencies/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.
Restriction and Notes	Clears all pending OPC bits. The Status Byte is set to 0.
Remote Command Notes	:SYST:PRES:USER:SAVE is used to save the current state as the user preset state.
Example	:SYST:PRES:USER:SAVE :SYST:PRES:USER:ALL
Instrument S/W Revision	A.01.60 or later

Save User Preset

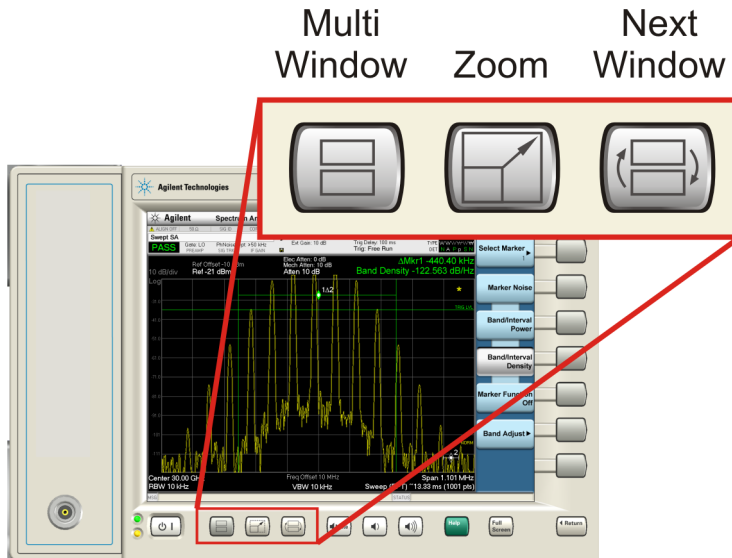
Save User Preset saves the currently active mode and its state. The way the user recalls this User Preset file is by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

Key Path	User Preset
Remote Command	:SYSTem:PRESet:USER:SAVE
Restriction and 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.
Example	:SYST:PRES:USER:SAVE
Instrument S/W Revision	A.01.60 or later

Measurement Display Windows

Window Control Keys

The instrument provides three front-panel keys for controlling windows. They are **Multi Window**, **Zoom**, and **Next Window**. These are all “immediate action” keys.



Multi-Window

The **Multi Window** front-panel key is not used at this time. It is there to support future functionality.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Zoom

Zoom is a toggle function. Pressing once Zooms the selected window; pressing again un-zooms.

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
 Preset: TILE
 Example: :DISP:WIND:FORM:ZOOM sets zoomed
 :DISP:WIND:FORM:TILE sets un-zoomed
 Instrument S/W Revision: A.01.60 or later

Next Window

This key selects the next window of the current view.

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

Remote Command: :DISPlay:WINDow[:SElect] <number>
 :DISPlay:WINDow[:SElect]?
 Min: 1
 Max: If <number> is greater than the number of windows, limit to
 <number of windows>
 Preset: 1
 Example: :DISP:WIND 1
 Instrument S/W Revision: A.01.60 or later

Selected Window One and only one window is always selected. The selected window has the focus; as far as the user is concerned, all key presses are going to that window.

If a window is not selected, its boundary is gray. The selected window has a green boundary.

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.

Navigating Windows When the Next Window key is pressed, the next window in the order of precedence (see below) becomes selected. If the selected window was zoomed, the next window will also be zoomed.

The window navigation does NOT use the arrow and select keys. Those are reserved for

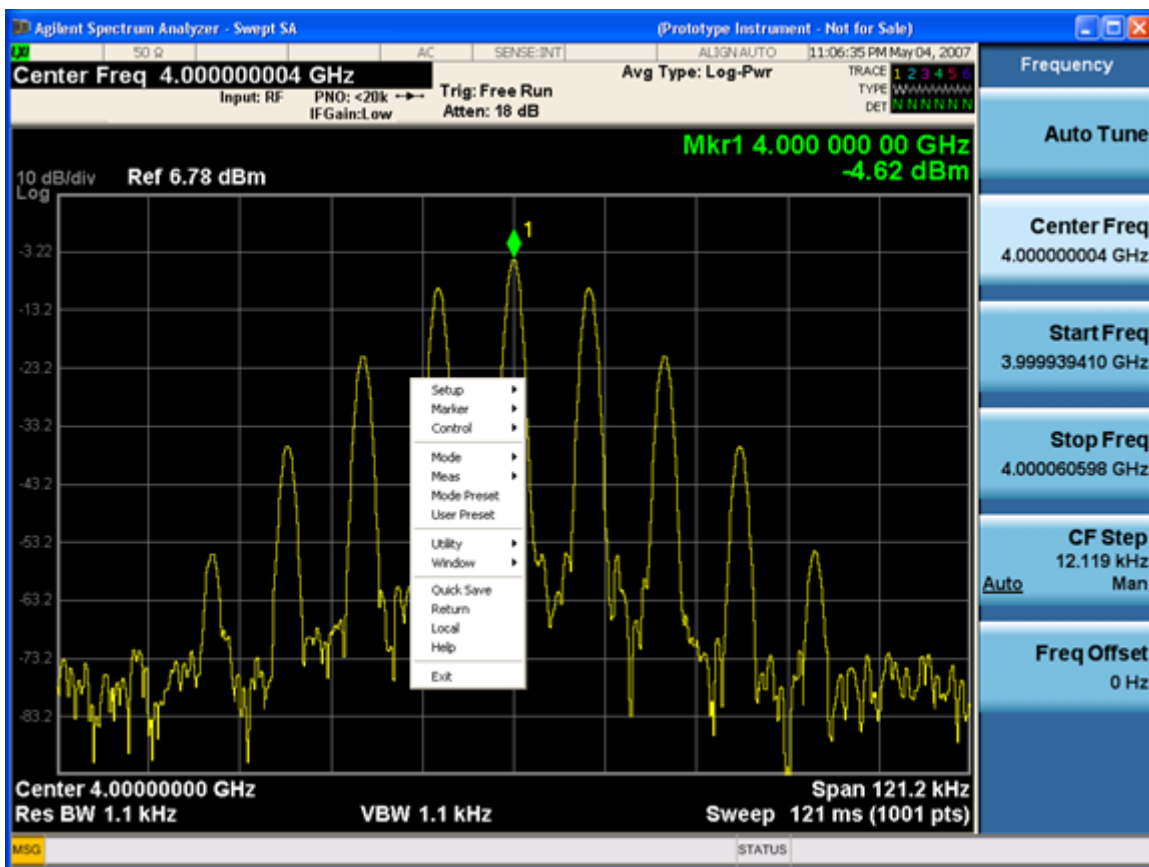
navigation within a window.

Mouse and Keyboard Control

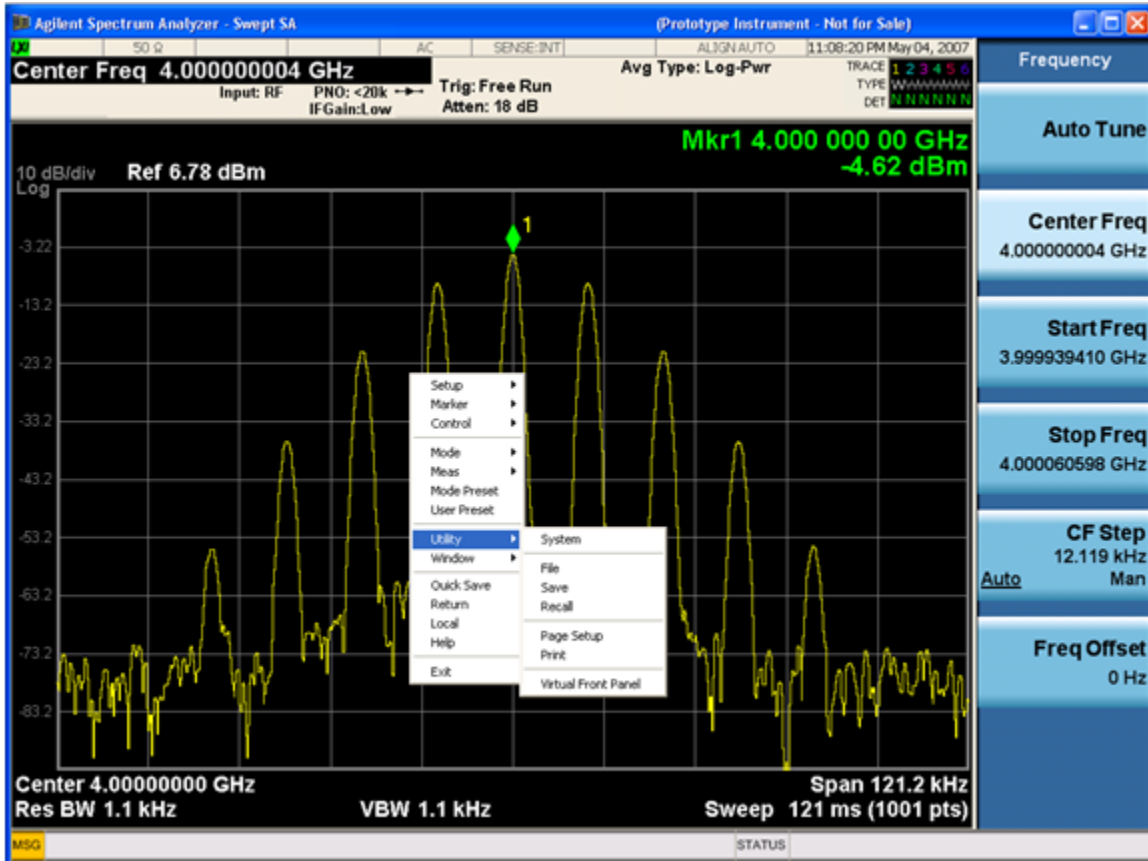
If you do not have access to the instrument front-panel, there are several ways that a mouse and PC Keyboard can give you access to functions normally accessed using the front-panel keys.

Right-Click

If the user plugs in a mouse and right-clicks on the analyzer screen, a menu will appear as below:

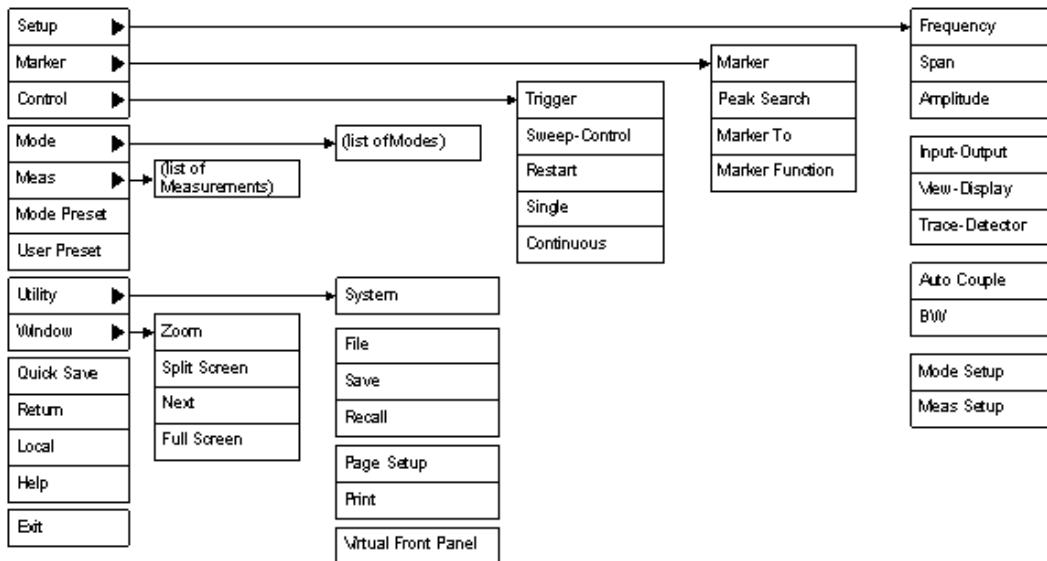


Placing the mouse on one of the rows marked with a right arrow symbol will cause that row to expand, as for example below where the mouse is hovered over the “Utility” row:



This method can be used to access any of the front-panel keys by using a mouse; as for example if the user is 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:

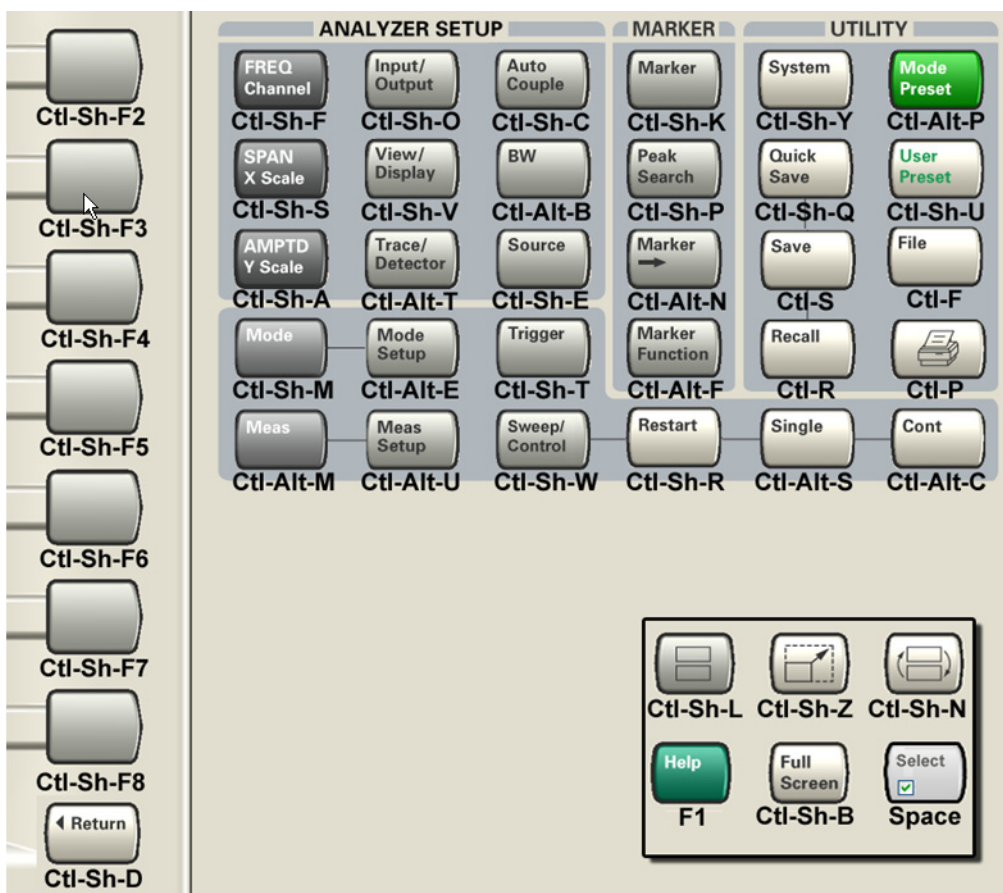
Frequency	CTRL+SHIFT+F
Span	CTRL+SHIFT+S
Amplitude	CTRL+SHIFT+A
Input/Output	CTRL+SHIFT+O
View/Display	CTRL+SHIFT+V
Trace/Detector	CTRL+ALT+T
Auto Couple	CTRL+SHIFT+C
Bandwidth	CTRL+ALT+B
Source	CTRL+SHIFT+E
Marker	CTRL+SHIFT+K
Peak Search	CTRL+SHIFT+P
Marker To	CTRL+ALT+N
Marker Function	CTRL+ALT+F
System	CTRL+SHIFT+Y
Quick Save	CTRL+SHIFT+Q
Save	CTRL+S
Recall	CTRL+R
Mode Preset	CTRL+M
User Preset	CTRL+U
Print	CTRL+P
File	CTRL+F
Mode	CTRL+SHIFT+M
Measure	CTRL+ALT+M
Mode Setup	CTRL+ALT+E
Meas Setup	CTRL+ALT+U
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+SHIFT+L
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

System Functions
Measurement Display Windows

1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
0	0

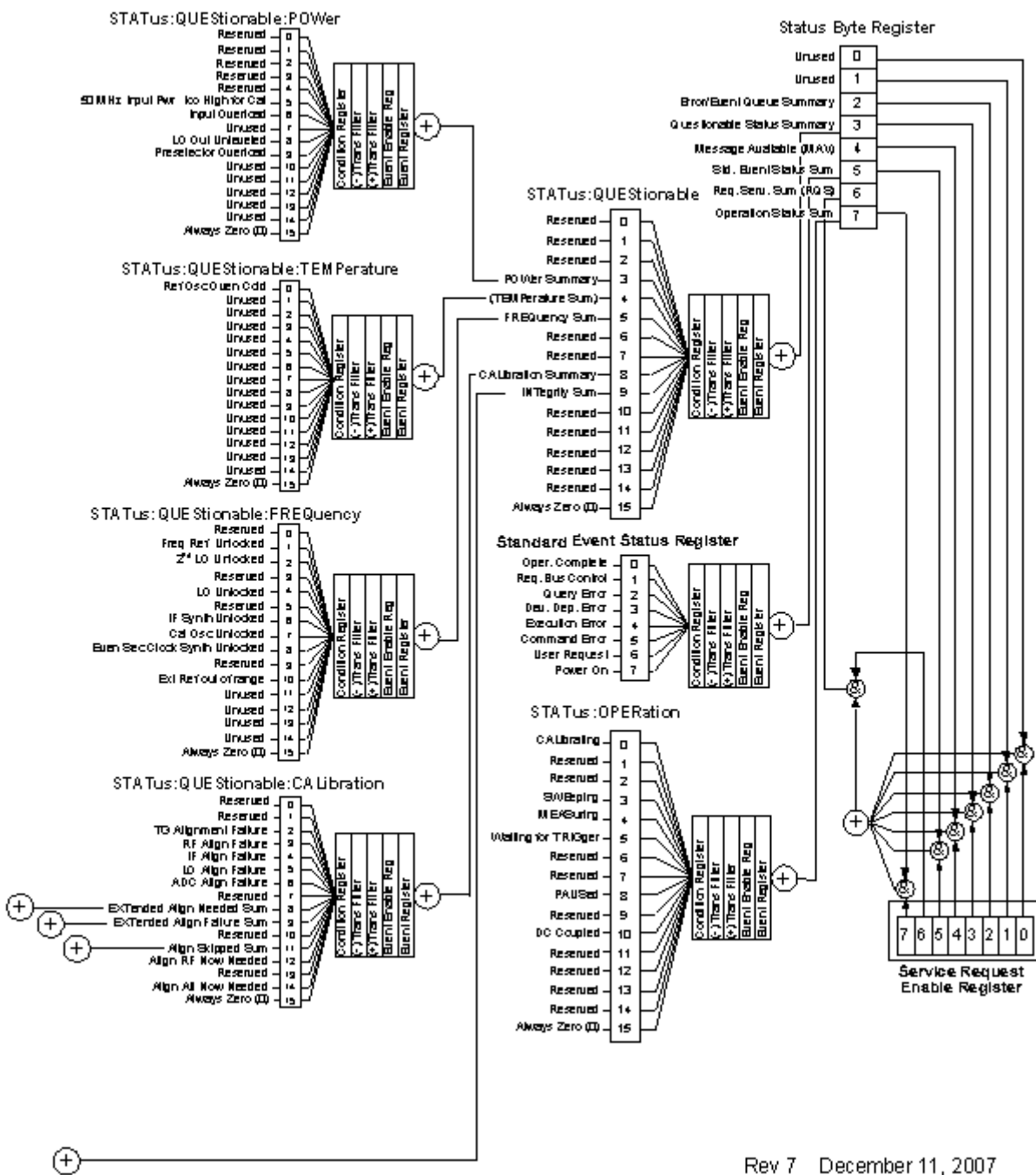
Here is a pictorial view of the table above:



STATUS Subsystem (No equivalent front-panel keys)

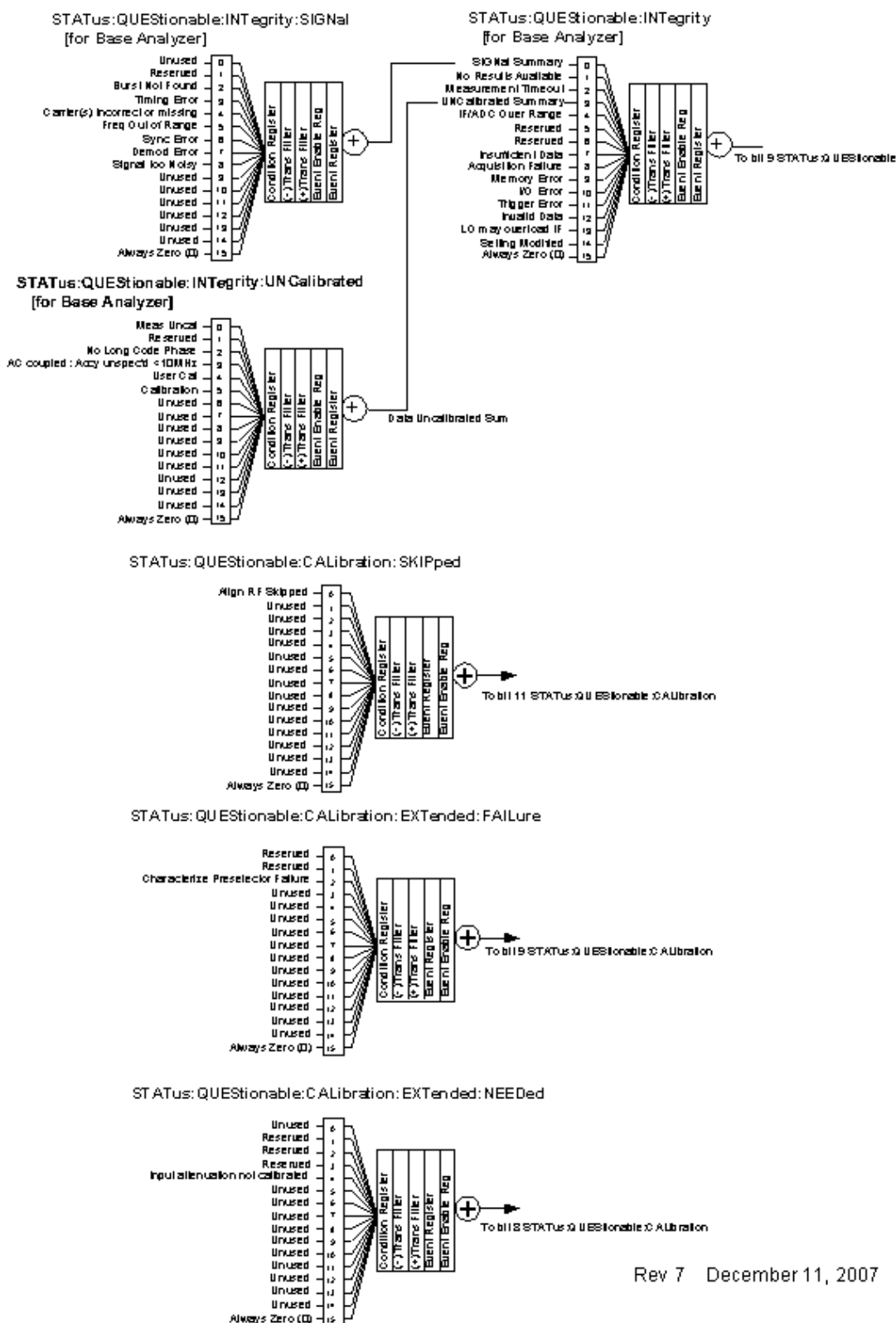
The following graphics show the current MXA Status Register Subsystem implementation.

MXA Status Byte Register System



Rev 7 December 11, 2007

Additional Registers:



Rev 7 December 11, 2007

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.

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:
 1. Determine which register contains the bit that reports the condition.
 2. Send the unique SCPI query that reads that register.
 3. 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).

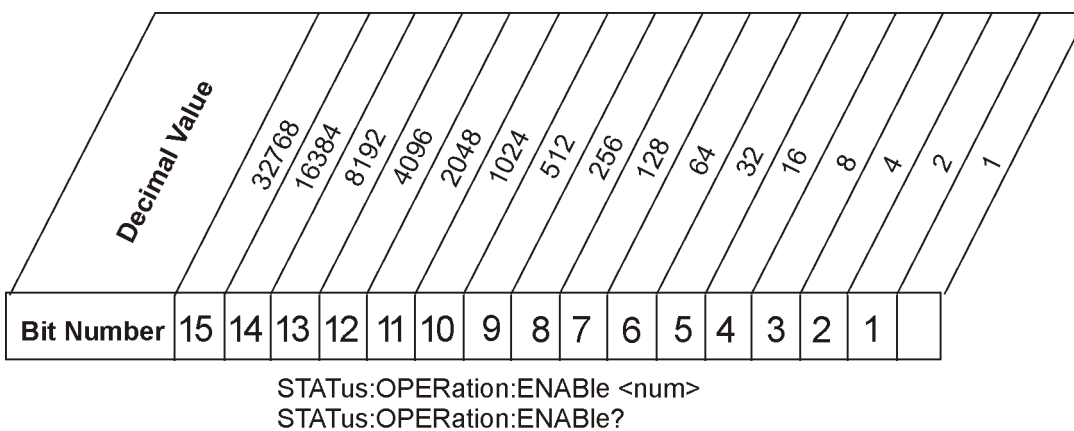
You can enable a particular bit(s), using the event enable register. The instrument will then monitor that particular condition(s). If the bit becomes true (0 to 1 transition) in the event register, it will stay set until the event register is cleared. Querying the event register allows you to detect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



Standard Operation Event Enable Register

ck730a

Bit 15 is not used to report status.

Example 1:

- To enable bit 0 and bit 6 of standard event status register, you would send the command *ESE 65 because $1 + 64 = 65$.
- 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:

- 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.
- It's usually a good idea to start by clearing all the status registers with *CLS.
- 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.
- 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.
- 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 whose 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.

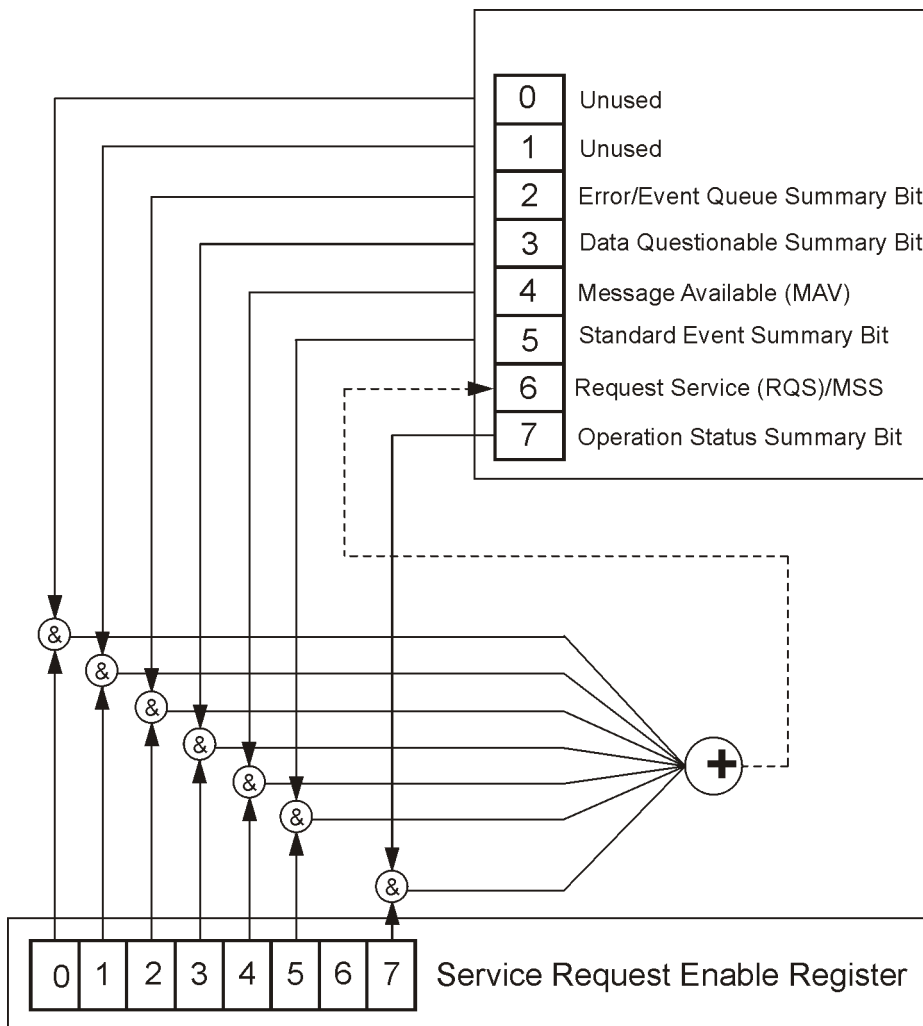
If the status register is configured to SRQ on end-of-measurement and the measurement is in continuous mode, then restarting a measurement (INIT command) can cause the measuring bit to pulse low. This causes an SRQ when you have not actually reached the "end-of-measurement" condition. To avoid this:

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



ck776a

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.

	Description	Standard Operation Status Summary Bit	Request Service (RQS) Summary Bit	Standard Event Status Summary Bit	Message Available (MAV)	Data Questionable Status Summary Bit	Error/Event Queue Summary Bit	Unused	Unused
Bit Number	7	6	5	4	3	2	1	0	

*STB?

Status Byte Register

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.

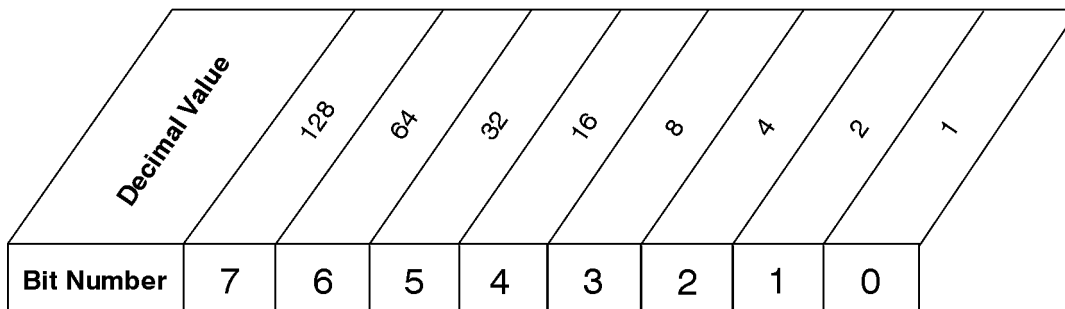
To query the status byte register, send the command *STB?. The response will be the decimal sum of the bits which are set to 1. For example, if bit number 7 and bit number 3 are set to 1, the decimal sum of the 2 bits is 128 plus 8. So the decimal value 136 is returned. The *STB command does not clear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

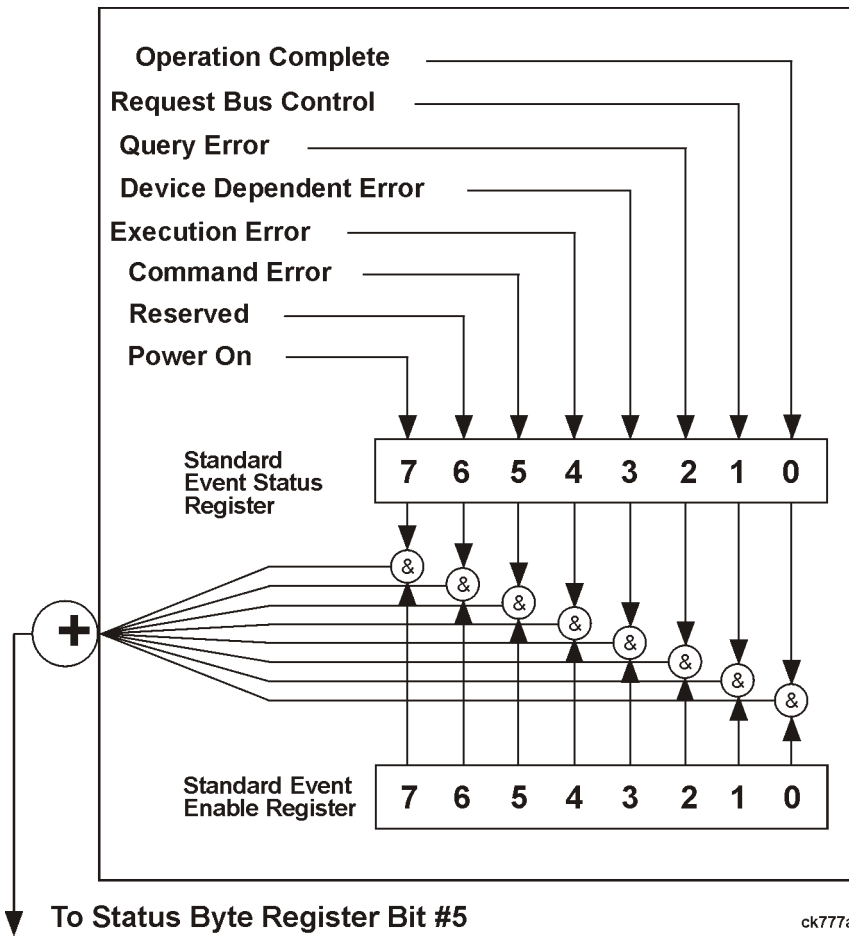


`*SRE <num>`
`*SRE?`

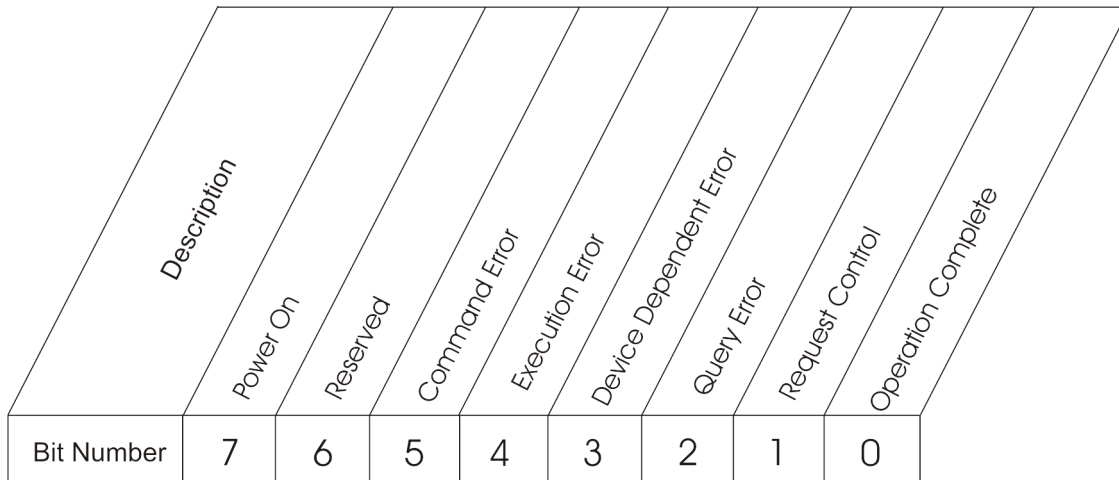
Service Request Enable Register

ck726a

Standard Event Status Register



The standard event status register contains the following bits:



*ESR?

Standard Event Status Register

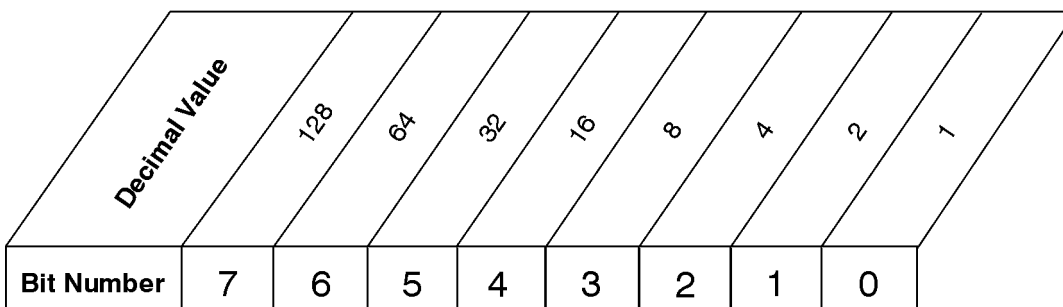
ck727a

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).



`*ESE <num>`
`*ESE?`

Standard Event Status Enable Register

ck728a

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.
8	Paused	The instrument is paused (waiting) because you have pressed the Pause Meas Control key or send the INITiate:PAUSe command. Bit is currently only valid for Modes: ESA/PSA: Spectrum Analysis, Phase Noise, and ESA: Bluetooth, cdmaOne, GSM

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 unlevelled 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, 11111111111111) See the SCPI Basics information about using bit patterns for variable parameters.

Operation Register

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:OPER:COND?
Remote Command	:STATus:OPERation:CONDition?
Preset	0
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:OPER:ENAB 1 Sets the register so that Align Now operation will be reported to the Status Byte Register.
Remote Command	:STATus:OPERation:ENABle <integer> :STATus:OPERation:ENABle?
Preset	0
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:OPER?
Remote Command	:STATus:OPERation[:EVENT]?
Preset	0
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:OPER:NTR 1 Align Now operation complete will be reported to the Status Byte Register.
Remote Command	:STATus:OPERation:NTRansition <integer> :STATus:OPERation:NTRansition?
Preset	0
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command

System Functions
STATUS Subsystem (No equivalent front-panel keys)

Example	STAT:OPER:PTR 1 Align Now operation beginning will be reported to the Status Byte Register.
Remote Command	:STATus:OPERation:PTRansition <integer> :STATus:OPERation:PTRansition?
Preset	32767
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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.

Example:	STAT:PRES
Remote Command:	:STATus:PRESet
Instrument S/W Revision:	A.01.60 or later

Questionable Register

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.
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Mode	All
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:COND?
Remote Command	:STATus:QUESTionable:CONDition?
Preset	0
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:OPER:PTR 1 Align Now operation beginning will be reported to the Status Byte Register.
Remote Command	:STATus:QUESTionable:ENABle 16 Sets the register so that temperature summary will be reported to the Status Byte Register :STATus:QUESTionable:ENABle?
Preset	0
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES?
Remote Command	:STATus:QUESTionable[:EVENT]?
Preset	0

Instrument S/W Revision A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:NTR 16 Temperature summary 'questionable cleared' will be reported to the Status Byte Register.
Remote Command	:STATus:QUESTionable:NTRansition 16 Temperature summary 'questionable cleared' will be reported to the Status Byte Register. :STATus:QUESTionable:NTRansition?
Preset	0
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:PTR 16 Temperature summary 'questionable asserted' will be reported to the Status Byte Register.
Remote Command	:STATus:QUESTionable:PTRansition <integer> :STATus:QUESTionable:PTRansition?
Preset	32767
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

Questionable Calibration Register

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:CAL:COND?
Remote Command	:STATus:QUESTionable:CALibration:CONDition?
Preset	0
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
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
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:CAL?
Remote Command	:STATus:QUESTionable:CALibration[:EVENT]?
Preset	0
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:CAL:NTR 16384 Alignment is not required.
Remote Command	:STATus:QUESTionable:CALibration:NTRansition <integer> :STATus:QUESTionable:CALibration:NTRansition?
Preset	0
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:CAL:PTR 16384 Alignment is required.
Remote Command	:STATus:QUESTionable:CALibration:PTRansition <integer> :STATus:QUESTionable:CALibration:PTRansition?

Preset	32767
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

Questionable Calibration Skipped Register

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:CAL:SKIP:COND?
Remote Command	:STATus:QUESTionable:CALibration:SKIPped:CONDition?
Preset	0
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:CAL:SKIP:ENAB 1 Can be used to query if an EMI alignment skipped condition is detected
Remote Command	:STATus:QUESTionable:CALibration:SKIPped:ENABle <integer> :STATus:QUESTionable:CALibration:SKIPped:ENABle?
Preset	32767
Min	0
Max	32767

Instrument S/W Revision A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:CAL:SKIP?
Remote Command	:STATus:QUESTionable:CALibration:SKIPPed[:EVENT]?
Preset	0
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:CAL:SKIP:NTR 1 Align RF skipped is not required.
Remote Command	:STATus:QUESTionable:CALibration:SKIPPed:NTRansition <integer> :STATus:QUESTionable:CALibration:SKIPPed:NTRansition?
Preset	0
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:CAL:SKIP:PTR 1 Align RF skipped is required.
Remote Command	:STATus:QUESTionable:CALibration:SKIPped:PTRansition <integer> :STATus:QUESTionable:CALibration:SKIPped:PTRansition?
Preset	32767
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

Questionable Calibration Extended Failure Register

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:CAL:EXT:FAIL:COND?
Remote Command	:STATus:QUESTionable:CALibration:EXTended:FAILure:CONDi tion?
Preset	0
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command

Example	STAT:QUES:CAL:EXT:FAIL:ENAB 1 Can be used to query if an EMI conducted alignment is needed.
Remote Command	:STATus:QUESTionable:CALibration:EXTended:FAILure:ENABLe <integer> :STATus:QUESTionable:CALibration:EXTended:FAILure:ENABLe?
Preset	32767
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:CAL:EXT:FAIL?
Remote Command	:STATus:QUESTionable:CALibration:EXTended:FAILure[:EVENT]?
Preset	0
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:CAL:EXT:FAIL:NTR 1 EMI conducted align failure is not required.

Remote Command	:STATus:QUESTionable:CALibration:EXTended:FAILure:NTRan sition <integer> :STATus:QUESTionable:CALibration:EXTended:FAILure:NTRan sition?
Preset	0
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:CAL:EXT:FAIL:PTR 1 EMI conducted align failure is required.
Remote Command	:STATus:QUESTionable:CALibration:EXTended:FAILure:PTRan sition <integer> :STATus:QUESTionable:CALibration:EXTended:FAILure:PTRan sition?
Preset	32767
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

Questionable Calibration Extended Needed Register

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
SCPI Status Bits/OPC Dependencies	Sequential command

System Functions
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Example	STAT:QUES:CAL:EXT:NEED:COND?
Remote Command	:STATus:QUESTionable:CALibration:EXTended:NEEDED:CONDition?
Preset	0
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:CAL:EXT:NEED:ENAB 2 Can be used to query if an EMI conducted alignment is needed.
Remote Command	:STATus:QUESTionable:CALibration:EXTended:NEEDED:ENABLE <integer> :STATus:QUESTionable:CALibration:EXTended:NEEDED:ENABLE ?
Preset	32767
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:CAL:EXT:NEED?

Remote Command	:STATus:QUESTionable:CALibration:EXTended:NEEDED[:EVENT]]?
Preset	0
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:CAL:EXT:NEED:NTR 2 Align EMI conducted is not required.
Remote Command	:STATus:QUESTionable:CALibration:EXTended:NEEDED:NTRansition <integer> :STATus:QUESTionable:CALibration:EXTended:NEEDED:NTRansition?
Preset	0
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:CAL:EXT:NEED:PTR 2 Align EMI conducted is required.
Remote Command	:STATus:QUESTionable:CALibration:EXTended:NEEDED:PTRansition <integer> :STATus:QUESTionable:CALibration:EXTended:NEEDED:PTRansition?
Preset	32767

System Functions
STATUS Subsystem (No equivalent front-panel keys)

Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

Questionable Frequency Register

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:FREQ:COND?
Remote Command	:STATus:QUESTionable:FREQuency:CONDition?
Preset	0
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:FREQ:ENAB 2 Frequency Reference Unlocked will be reported to the Frequency Summary of the Status Questionable register.
Remote Command	:STATus:QUESTionable:FREQuency:ENABle <integer> :STATus:QUESTionable:FREQuency:ENABle?
Preset	32767
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:FREQ?
Remote Command	:STATus:QUESTionable:FREQuency[:EVENT]?
Preset	0
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:FREQ:NTR 2 Frequency Reference 'regained lock' will be reported to the Frequency Summary of the Status Questionable register.
Remote Command	:STATus:QUESTionable:FREQuency:NTRansition <integer> :STATus:QUESTionable:FREQuency:NTRansition?
Preset	0
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:FREQ:PTR 2 Frequency Reference 'became unlocked' will be reported to the Frequency Summary of the Status Questionable register.
Remote Command	:STATus:QUESTionable:FREQuency:PTRansition <integer> :STATus:QUESTionable:FREQuency:PTRansition?
Preset	32767
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

Questionable Integrity Register

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:INT:COND?
Remote Command	:STATus:QUESTionable:INTEgrity:CONDition?
Preset	0
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command

Example	STAT:QUES:INT:ENAB 8 Measurement Uncalibrated Summary will be reported to the Integrity Summary of the Status Questionable register.
Remote Command	:STATus:QUESTionable:INTEgrity:ENABle <integer> :STATus:QUESTionable:INTEgrity:ENABle?
Preset	32767
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:INT?
Remote Command	:STATus:QUESTionable:INTEgrity[:EVENT]?
Preset	0
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:INT:NTR 8 Measurement 'regained calibration' Summary will be reported to the Integrity Summary of the Status Questionable register.

Remote Command	:STATus:QUEStionable:INTEgrity:NTRansition <integer> :STATus:QUEStionable:INTEgrity:NTRansition?
Preset	0
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:INT:PTR 8 Measurement 'became uncalibrated' Summary will be reported to the Integrity Summary of the Status Questionable register.
Remote Command	:STATus:QUEStionable:INTEgrity:PTRansition <integer> :STATus:QUEStionable:INTEgrity:PTRansition?
Preset	32767
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

Questionable Integrity Signal Register

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:INT:SIGN:COND?
Remote Command	:STATus:QUEStionable:INTEgrity:SIGNal:CONDition?

Preset	0
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:INT:SIGN:ENAB 4 Burst Not Found will be reported to the Integrity Summary of the Status Questionable register.
Remote Command	:STATus:QUESTionable:INTEgrity:SIGNal:ENABle <integer> :STATus:QUESTionable:INTEgrity:SIGNal:ENABle?
Preset	32767
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:INT:SIGN?
Remote Command	:STATus:QUESTionable:INTEgrity:SIGNal[:EVENT]?
Preset	0
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:INT:SIGN:NTR 4 Burst found will be reported to the Integrity Summary of the Status Questionable register.
Remote Command	:STATus:QUESTionable:INTEgrity:SIGNal:NTRansition <integer> :STATus:QUESTionable:INTEgrity:SIGNal:NTRansition?
Preset	0
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:INT:SIGN:PTR 4 Burst not found will be reported to the Integrity Summary of the Status Questionable register.
Remote Command	:STATus:QUESTionable:INTEgrity:SIGNal:PTRansition <integer> :STATus:QUESTionable:INTEgrity:SIGNal:PTRansition?
Preset	32767
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

Questionable Integrity Uncalibrated Register

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:INT:UNC:COND?
Remote Command	:STATus:QUESTionable:INTEgrity:UNCalibrated:CONDition?
Preset	0
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:INT:UNC:ENAB 1 Oversweep (Meas Uncal) will be reported to the Integrity Summary of the Status Questionable register.
Remote Command	:STATus:QUESTionable:INTEgrity:UNCalibrated:ENABle :STATus:QUESTionable:INTEgrity:UNCalibrated:ENABle?
Preset	32767
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:INT:UNC?
Remote Command	:STATus:QUEStionable:INTEgrity:UNCalibrated[:EVENT]?
Preset	0
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:INT:UNC:NTR 1 Oversweep cleared will be reported to the Integrity Summary of the Status Questionable register.
Remote Command	:STATus:QUEStionable:INTEgrity:UNCalibrated:NTRansition <integer> :STATus:QUEStionable:INTEgrity:UNCalibrated:NTRansition ?
Preset	0
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command

Example	STAT:QUES:INT:UNC:PTR 1 Oversweep (Meas Uncal) occurred will be reported to the Integrity Summary of the Status Questionable register.
Remote Command	:STATus:QUESTionable:INTEgrity:UNCalibrated:PTRansition <integer> :STATus:QUESTionable:INTEgrity:UNCalibrated:PTRansition ?
Preset	32767
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

Questionable Power Register

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:POW:COND?
Remote Command	:STATus:QUESTionable:POWer:CONDition?
Preset	0
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
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.

Remote Command	:STATus:QUEStionable:POWer:ENABle <integer> :STATus:QUEStionable:POWer:ENABle?
Preset	32767
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:POW?
Remote Command	:STATus:QUEStionable:POWer[:EVENT]?
Preset	0
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
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.
Remote Command	:STATus:QUEStionable:POWer:NTRansition <integer> :STATus:QUEStionable:POWer:NTRansition?
Preset	0
Min	0

Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
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.
Remote Command	:STATus:QUESTionable:POWer:PTRansition <integer> :STATus:QUESTionable:POWer:PTRansition?>
Preset	32767
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

Questionable Temperature Register

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:TEMP:COND?
Remote Command	:STATus:QUESTionable:TEMPerature:CONDition?
Preset	0
Instrument S/W Revision	A.01.60 or later

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

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

Mode	All
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:TEMP:ENAB 1 Reference Oscillator Oven Cold will be reported to the Temperature Summary of the Status Questionable register.
Remote Command	:STATus:QUESTionable:TEMPerature:ENABle <integer> :STATus:QUESTionable:TEMPerature:ENABle?
Preset	32767
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:TEMP?
Remote Command	:STATus:QUESTionable:TEMPerature[:EVENT]?
Preset	0
Instrument S/W Revision	A.01.60 or later

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
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SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:TEMP:NTR 1 Reference Oscillator Oven not cold will be reported to the Temperature Summary of the Status Questionable register.
Remote Command	:STATus:QUESTionable:TEMPerature:NTRansition <integer> :STATus:QUESTionable:TEMPerature:NTRansition?
Preset	0
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

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
SCPI Status Bits/OPC Dependencies	Sequential command
Example	STAT:QUES:TEMP:PTR 1 Reference Oscillator Oven became cold will be reported to the Temperature Summary of the Status Questionable register.
Remote Command	:STATus:QUESTionable:TEMPerature:PTRansition <integer> :STATus:QUESTionable:TEMPerature:PTRansition?
Preset	32767
Min	0
Max	32767
Instrument S/W Revision	A.01.60 or later

IEEE Common GPIB Commands

Numeric values for bit patterns can be entered using decimal or hexi-decimal representations. (i.e. 0 to 32767 is equivalent to #H0 to #H7FFF).

Calibration Query

*CAL? Performs a full alignment and returns a number indicating the success of the alignment. A zero is returned if the alignment is successful. A one is returned if any part of the alignment fails. The equivalent SCPI command is CALibrate[:ALL]?

See “Alignments” on page 193 for details of *CAL?.

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.

Remote Command:	*CLS
Key Path:	No equivalent key. Related key System, Show Errors, Clear Error Queue
SCPI Status Bits/OPC Dependencies:	Resets all bits in all event registers to 0, which resets all the status byte register bits to 0 also.
Remote Command Notes:	For related commands, see the SYSTem:ERRor[:NEXT]? command. See also the STATus:PRESet command and all commands in the STATus subsystem.
Example:	*CLS Clears the error queue and the Status Byte Register.
Instrument S/W Revision:	A.01.60 or later

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.

SCPI Status Bits/OPC Dependencies	Event Enable Register of the Standard Event Status Register.
Remote Command	*ESE <integer> *ESE?

Remote Command Notes	For related commands, see the STATus subsystem and SYSTem:ERRor[:NEXT]? commands.
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.
Key Path	No equivalent key. Related key System, Show Errors, Clear Error Queue
Preset	255
State Saved	Not saved in state.
Min	0
Max	255
Instrument S/W Revision	A.01.60 or later

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.

SCPI Status Bits/OPC Dependencies:	Standard Event Status Register (bits 0 – 7).
Remote Command:	*ESR?
Preset:	0
Min:	0
Max:	255
Remote Command Notes:	For related commands, see the STATus subsystem commands.
Example:	*ESR? Returns a 1 if there is either a query or command error, otherwise it returns a zero.
Instrument S/W Revision:	A.01.60 or later

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: Agilent Technologies,N9020A,US01020004,A.01.02
Instrument S/W Revision	A.01.60 or later

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.

SCPI 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.
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.
Instrument S/W Revision:	A.01.60 or later

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?
Instrument S/W Revision: A.01.60 or later

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.

SCPI Status Bits/OPC The command is sequential.
Dependencies:

Remote Command: *RCL <register #>

Restriction and Notes: Registers 0 through 6 are accessible from the front panel in menu keys for Recall Registers.

Min: 0

Max: 127

Example: *RCL 7 Recalls the instrument state that is currently stored in register 7.

Instrument S/W A.01.60 or later
Revision:

Save Instrument State

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

SCPI Status Bits/OPC The command is sequential.
Dependencies:

Remote Command: *SAV <register #>

Restriction and Notes:	Registers 0 through 6 are accessible from the front panel in menu keys for Save Registers.
Min:	0
Max:	127
Example:	*SAV 9 Saves the instrument state in register 9.
Instrument S/W Revision:	A.01.60 or later

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.

SCPI Status Bits/OPC Dependencies:	Service Request Enable Register (all bits, 0 – 7).
Remote Command:	*SRE <integer> *SRE?
Preset:	0
Min:	0
Max:	255
Remote Command Notes:	For related commands, see the STATus subsystem and SYSTem:ERRor[:NEXT]? commands.
Example:	*SRE 22 Enables bits 1, 2, and 4 in the service request enable register.
Instrument S/W Revision:	A.01.60 or later

Status Byte Query

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

SCPI Status Bits/OPC Dependencies:	Status Byte Register (all bits, 0 – 7).
Remote Command:	*STB?
Remote Command Notes:	See related command *CLS.

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.

Instrument S/W A.01.60 or later
Revision:

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

Remote Command Notes See related command :INITiate:IMMEDIATE.

Example *TRG Triggers the instrument to take a sweep or start a measurement, depending on the current instrument settings.

Instrument S/W Revision A.01.60 or later

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.

Instrument S/W Revision: A.01.60 or later

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.

SCPI Status Bits/OPC Not global to all remote ports or front panel. *OPC only
Dependencies: considers operation that was initiated on the same port as the *OPC command was issued from.

Remote Command: *WAI

Example: INIT:CONT OFF; INIT;*WAI Sets the instrument to single sweep. Starts a sweep and waits for its completion.

System Functions
IEEE Common GPIB Commands

Instrument S/W
Revision:

A.01.60 or later

Mode

This key accesses a menu to allow you to select installed measurement applications, including the LTE mode.

Key Path	Front Panel
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

LTE

To invoke LTE mode, select “LTE” softkey under Mode menu.

For LTE, the mode ID to select using SCPI command is as follows:

‘LTE’ for ‘:INSTRument[:SElect]’

102 for ‘:INSTRument:NSElect’

Key Path	Front Panel
Remote Command	:INSTRument[:SElect] LTE :INSTRument:NSElect 102
Help Map ID	28880
Instrument S/W Revision	A.01.60 or later

Mode Setup

This key accesses a menu to allow you to select mode parameters. These settings will be in effect for all measurements in the current mode.

Key Path	Front Panel
Help Map ID	28881
Instrument S/W Revision	A.01.60 or later

Direction

This key allows you to set the Direction of the signal being measured. The choice of link direction will determine the Sync/Format, Chan Profile, Time and Advanced menus will all change based on the link direction selected. Also, since downlink and uplink signals use OFDMA and SC-FDMA respectively, the list of trace results available and the default traces presented will also change based on the link direction parameter.

Key Path	Mode Setup
Mode	VSA
Remote Command	[:SENSe]:RADio:STANdard:DIRection DLINk ULINk [:SENSe]:RADio:STANdard:DIRection?
Example	RAD:STAN:DIR DLIN
Dependencies/Couplings	Changes in Direction affect many other modulation analysis setup parameters
Preset	DLIN
State Saved	Saved in instrument state.
Range	Downlink Uplink
Help Map ID	28882
Instrument S/W Revision	A.01.60 or later

Bandwidth

This key allows you to set the Bandwidth of the signal being measured.

Key Path	Mode Setup
Mode	VSA

Remote Command	[:SENSE] :RADio:STANdard:BANDwidth B1M4 B3M B5M B10M B15M B20M [:SENSE] :RADio:STANdard:BANDwidth?
Example	RAD:STAN:BAND B5M
Dependencies/Couplings	Bandwidth changes affect instrument span
Preset	B5M
State Saved	Saved in instrument state.
Range	1.4 MHz (6 RB) 3 MHz (15 RB) 5 MHz (25 RB) 10 MHz (50 RB) 15 MHz (75 RB) 20 MHz (100 RB)
Help Map ID	28883
Instrument S/W Revision	A.01.60 or later

Preset to Standard

This parameter presets all demod parameters to their default values, and also presets the instrument span to an appropriate value for the selected standard.

Key Path	Mode Setup
Mode	VSA
Remote Command	[:SENSE] :RADio:STANdard:PRESet B1M4 B3M B5M B10M B15M B20M
Example	RAD:STAN:PRES B5M
Dependencies/Couplings	Presets the instrument span to an appropriate value for the selected bandwidth setting and sets other parameters to their preset value.
Preset	B5M
State Saved	Saved in instrument state.
Range	1.4 MHz (6 RB) 3 MHz (15 RB) 5 MHz (25 RB) 10 MHz (50 RB) 15 MHz (75 RB) 20 MHz (100 RB)
Help Map ID	28884
Instrument S/W Revision	A.01.60 or later

Restore Mode Defaults

Restore Mode Defaults resets the state for the currently active mode by resetting the mode persistent settings to their factory default values, clearing mode data and by performing a Mode Preset

For more information, see the section under the Preset key in the Utility section.

Key Path	Mode setup
Help Map ID	28885
Instrument S/W Revision	A.01.60 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 Setup, More
Mode	LTE
Remote Command	[:SENSe] :SPEctrum NORMal INVert [:SENSe] :SPEctrum?
Example	SPEC INV SPEC?
Preset	NORM
State Saved	Saved in instrument state.
Range	Normal Invert
Help Map ID	28886
Instrument S/W Revision	A.01.60 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, More
Mode	LTE
Help Map ID	28887
Instrument S/W Revision	A.01.60 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	Mode Setup, More, Fixed Equalization
Mode	LTE
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
Help Map ID	28888
Instrument S/W Revision	A.01.60 or later

Freq Response Register

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

Key Path	Mode Setup, More, Fixed Equalization
Mode	LTE
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
Help Map ID	28889
Instrument S/W Revision	A.01.60 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	LTE
Remote Command	[:SENSE]:CORRection:FEQualizer:RELative?
Example	CORR:FEQ:REL?
Notes	Returns 1 if fixed equalizer frequency mapping is relative; 0 otherwise.
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

Auto Couple

Key Path	Front Panel
Mode	LTE
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

BW

There is no mode-level BW functionality.

Key Path	Front Panel
Mode	LTE
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

FREQ Channel

Frequency hardkey is different for each measurement and is described in the measurement PD for each measurement.

Key Path	Front Panel
Mode	LTE
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

Input/Output

Input/Output functionality is described in the Meas Common PD. Contact LP if you need to update that section for this application mode.

Key Path	Front Panel
Mode	LTE
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

Source

There is no meas global functionality.

Key Path	Front Panel
Mode	LTE
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

SPAN X Scale

There is no specific meas global functionality. Refer to PD - VSA (VXA) Meas Common for Span/Xscale functionality.

Key Path	Front Panel
Mode	LTE
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

Sweep/Control

This key displays a menu allowing you to control time-related measurement parameters, and to pause or resume the measurement.

Key Path	Front Panel
Mode	LTE
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

Pause / Resume

Pauses or resumes acquisition at the end of the current time record acquisition. You may pause when in continuous mode, or if in the middle of an averaged measurement. The key does nothing when at the end of an averaged measurement in Single sweep mode.

For more information see the Measurement Functions, Sweep/Control for a description of this function.

Key Path	Front Panel
Mode	VSA
Help Map ID	28892
Instrument S/W Revision	A.01.60 or later

Measure

This key accesses a menu to allow you to select the active LTE measurement.

Key Path	Front Panel
Help Map ID	28890
Instrument S/W Revision	A.01.60 or later

Modulation Analysis

This key invokes the Modulation Analysis measurement.

Key Path	Measure
Help Map ID	28891
Instrument S/W Revision	A.01.60 or later

Monitor Spectrum

This key invokes the Monitor Spectrum measurement.

Key Path	Measure
Help Map ID	28893
Instrument S/W Revision	A.01.60 or later

This key selects the LTE Modulation Analysis measurement.

Key Path	Meas
Mode	LTE
Instrument S/W Revision	A.01.60 or later

This Help section contains the following topics:

Description

Remote Commands

Remote SCPI Results:

Description

All of the scalar results for this measurement are contained in one table and hence have one equivalent subopcode for the remote results. The remote user can use this equivalence by either visually inspecting the corresponding summary trace on the display, or by using CALC:DATA queries which programmatically describe the corresponding summary trace.

Remote Commands

```
:CONFigure:EVM
:FETCh:EVM[n]?
:INITiate:EVM
:MEASure:EVM[n]?
:READ:EVM[n]?
```

Remote SCPI Results:

NOTE: This standard remote result is also available thru the CALC:DATA<n> set of queries, where <n> is a reference to the trace number. The results assigned to each trace vary depending on which tests are enabled. As an example, with the default trace layout, these results in the Error Summary results are returned by CALC:EVM:DATA4:TABLE? See Common Functions, Data Queries, CALCulate:DATA for more details.

The following table denotes the LTE Modulation Analysis specific results returned from the (FETCh | MEASure | READ):EVM commands, and their corresponding CALC:DATA queries, indexed by subopcode.

Note that valid results are only returned if the Symbols/Errors trace is being computed. It must be selected though it is not necessary for it to be shown in the current Layout.

Note that there are more results available that are supported by the LTE Mode. These are

documented under `Data Queries`, `MEASure`, `READ`, `FETCh`.

N	Results Returned
Not specified or n=1	Returns 20 comma-separated scalar results, corresponding exactly to the items returned in the Error Summary: <ol style="list-style-type: none"> 1. EVM RCE (%rms) 2. EVM Sym Time Adjust 3. EVM Pk (%) 4. EVM Pk Index 5. EVM Peak Sub Car Index 6. Data EVM (%rms) 7. RS EVM (%rms) 8. Freq Error (Hz) 9. Sync Corr (%) 10. Common Tracking Error (%rms) 11. Symbol Clock Error (ppm) 12. Time Offset (s) 13. IQ Offset (dB) 14. IQ Gain Imbalance (dB) 15. IQ Quad Error (deg) 16. IQ Timing Skew (s) 17. CP Length Mode 18. RS-OS / PRS 19. Cell ID 20. Cell ID Group/Sector

If the results are not available, NaN (9.91e37) is returned.

In addition to these results, other results are defined in LTE - Additional Measurement Functions, [“Remote Results” on page 622](#).

Amplitude (AMPTD) Y Scale

This menu has controls for the input signal conditioning as well as the Y-scaling of trace data. For more information, see LTE - Additional Measurement Functions, “[AMPTD Y Scale \(Amplitude\)](#)” on page 492.

Key Path	Front-panel key
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement which have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key is meas local key, so its actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

For more information, see LTE - Additional Measurement Functions, [“AUTO COUPLE” on page 500](#).

Key Path	Front-panel key
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Cont (Continuous Measurement/Sweep)

Cont 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.

For more information, see Common Measurement Functions, “[Cont \(Continuous Measurement/Sweep\)](#)” on page 813.

Key Path	Front-panel key
Mode	LTE
Instrument S/W Revision	A.01.60 or later

BW

The BW key provides access to a menu that allows you to set the FFT Window for the Spectrum and Inst Spectrum measurement results.

For more information see: LTE - Additional Measurement Functions, “[BW \(Bandwidth\)](#)” on page 501

Key Path	Front Panel
Mode	LTE
Instrument S/W Revision	A.01.60 or later

FFT Window

This key allows you to choose the Window function that is applied to the time data prior to the FFT calculation used for Spectrum and Inst Spectrum measurement results.

For more information, see LTE - Additional Measurement Functions, BW, FFT Window.

Key Path	BW
Mode	LTE
Preset	Flat Top
Instrument S/W Revision	A.01.60 or later

FREQ Channel

This key provides access to a menu that allows control over the Center, Start, or Stop Frequency settings. For more information, see LTE - Additional Measurement Functions, “FREQ Channel” on page 507.

Key Path	Front Panel
Mode	LTE
Instrument S/W Revision	A.01.60 or later

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.

Other functions related to the input/output connections can be found under **Trig** (trigger input controls) and **System** (LAN and other I/O bus configurations) and **Amplitude** (optional internal preamp).

The functions in the Input/Output menu are common to all Modes (applications). They are “global”. But individual functions are only available in a mode if they make sense. They will be grayed out (as opposed to not showing them at all). This is a special behavior of the Input/Output Menu, which is the only menu that is common across all applications.

For more information, see LTE - Additional Measurement Functions, [“Input/Output” on page 511](#).

Key Path	Front-panel key
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Marker

The Marker hardkey displays the Marker menu. A marker can be placed on a trace to allow the value of the trace data at the marker position to be determined precisely. Markers can also be used in pairs to read the difference (or delta) between two data points. They can also be used to make power calculations over a band of frequencies or a time interval. See Marker Functions below for more details.

The functions in this menu include a 1-of-N selection of the control mode Normal, Delta, Fixed, or Off for the selected marker. The control mode is described below.

Pressing Marker always makes the selected maker's X position the active function.

If the currently selected marker is Off, pressing Marker sets it to Normal mode and places it at the center of the screen on the currently selected trace.

As a convenience, if there are no markers displayed on the current trace, pressing the marker hardkey (whenever the marker menu is already showing) selects the lowest numbered marker that is currently off and turns it on in normal mode on the selected trace. In other words, pressing the Marker hardkey twice will always turn on a marker on the selected trace if none was turned on before.

For more information see the LTE - Additional Measurement Functions “[Marker](#)” on page [512](#) for a description of this function.

Key Path	Marker
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Marker Fctn (Function)

There are no measurement unique Marker Function SCPI/functions.

For more information see the LTE - Additional Measurement Functions [“Marker Function”](#) on page 529 for a description of this function..

Key Path	Marker Fctn
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Marker > (Marker To)

There are no measurement unique Marker To SCPI/functions.

For more information see the LTE - Additional Measurement Functions [“Marker To”](#) on [page 538](#) for a description of this function.

Key Path	Marker >
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Meas (Measure)

For Meas key information see “[LTE Modulation Analysis](#)” on page 339.

Meas Setup

This key provides a menu allowing you to select measurement parameters for the current measurement.

For more information see the LTE - Additional Measurement Functions “[Meas Setup](#)” on [page 541](#) for a description of this function.

Key Path	Front Panel
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Avg Number

This key turns averaging on or off and sets the number of time records whose measurement results will be averaged.

For more information see the LTE - Additional Measurement Functions “[Meas Setup](#)” on [page 541](#) for a description of this function.

Key Path	Meas Setup
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Averaging applies to a limited set of measurement results in LTE Modulation Analysis. RMS and Max average types apply to the Spectrum and Ch Frequency Response traces. The behavior for these types is the same as in the Vector Analysis Measurement. Averaging of numeric error data in the symbol table is described below:

Average Type	Average Mode	Effects of averaging
RMS	any (single sweep)	After each scan, the Syms/Err table shows a running (linear) average over past scans for each parameter in the table. Peak or position parameters are not averaged. Parameters that appear in the table in dB are converted to linear units in order to average them. The measurement stops after the specified Avg Number of scans.
RMS	repeat (continuous sweep)	Same as above, except that averages are reset after the specified Avg Number of scans, and the measurement continues.
RMS	exponential (continuous sweep)	Same as the single sweep case until the specified Avg Number of scans is complete. After that, averaging continues using exponential weighting.

Max	any	After each scan, compares each parameter in the table with the current scan's value and keeps the maximum. Symbol positions relate to the maximum peak value seen.
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Average Mode

Average Mode determines what happens if the Sweep Control is in Continuous mode and the number of time records processed exceeds the Average Number (see above). If the Sweep Control is in Single mode, this setting has no effect. There are no SCPI/features unique to this measurement. For more information see Measurement Functions, Meas Setup, Average Mode.

Key Path	Meas Setup
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Average Setup

These parameters are for less commonly needed averaging setups. There are no SCPI/features unique to this measurement. For more information, see the View/Display, Layout section.

Key Path	Meas Setup
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Sync/Format Setup (Downlink)

This key brings up a menu of commonly used sync/format setup parameters when Direction is set to Downlink.

Key Path	Meas Setup
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Sync Type

This key allows you to select the Sync Type to use.

Key Path	Meas Setup, Sync/Format Setup, More
Mode	LTE
Remote Command	[:SENSE] :EVM:DLINK:SYNC:TYPE PSS RS [:SENSE] :EVM:DLINK:SYNC:TYPE

Example	EVM:DLIN:SYNC:TYPE PSS
Notes	This parameter applies to both Downlink and Uplink
Preset	PSS
State Saved	Saved in instrument state.
Range	PSS RS
Instrument S/W Revision	A.01.60 or later

PSCH Selects PSCH Sync Type.

Key Path	Meas Setup, Sync/Format Setup, Sync Type
Mode	LTE
Instrument S/W Revision	A.01.60 or later

RS Selects RS (Ref Signal) Sync Type.

Key Path	Meas Setup, Sync/Format Setup, Sync Type
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Cyclic Prefix Length

This key allows you to select whether to automatically detect the cyclic prefix length or specify the cyclic prefix length.

Key Path	Meas Setup, Sync/Format Setup
Mode	LTE
Remote Command	[:SENSe] :EVM:DLINK:SYNC:CPLength AUTO NORMAl EXTended [:SENSe] :EVM:DLINK:SYNC:CPLength?
Example	EVM:DLIN:SYNC:CPL AUTO
Notes	This parameter applies to both Downlink and Uplink
Preset	AUTO
State Saved	Saved in instrument state.
Range	Auto Normal Extended
Instrument S/W Revision	A.01.60 or later

Auto Selects Auto Cyclic Prefix Length.

Key Path	Meas Setup, Sync/Format Setup, Cyclic Prefix Length
----------	--

Mode LTE
Instrument S/W Revision A.01.60 or later

Normal Selects Normal Cyclic Prefix Length.

Key Path **Meas Setup, Sync/Format Setup, Cyclic Prefix Length**
Mode LTE
Instrument S/W Revision A.01.60 or later

Extended Selects Extended Cyclic Prefix Length.

Key Path **Meas Setup, Sync/Format Setup, Cyclic Prefix Length**
Mode LTE
Instrument S/W Revision A.01.60 or later

RS-PRS

This key allows you to set the RS_PRS.

Key Path **Meas Setup, Sync/Format Setup**
Mode LTE
Remote Command [:SENSe]:EVM:DLINk:SYNC:RSPRS AUTO|CUSTom
[:SENSe]:EVM:DLINk:SYNC:RSPRS
Example EVM:DLIN:SYNC:RSPR AUTO
Preset CUSTom
State Saved Saved in instrument state.
Range Auto | Custom
Instrument S/W Revision A.01.60 or later

Auto Selects Auto for the RS-PRSs.

Key Path **Meas Setup, Sync/Format Setup, RS-PRS**
Mode LTE
Instrument S/W Revision A.01.60 or later

Custom Selects Custom for the RS-PRS.

Key Path **Meas Setup, Sync/Format Setup, RS-PRS**

Mode LTE
 Instrument S/W Revision A.01.60 or later

Cell ID

This key allows you to auto-detect the Cell ID from the SSCH content or manually select the Cell ID to use.

Key Path **Meas Setup, Sync/Format Setup**
 Mode LTE
Remote Command [:SENSe]:EVM:DLINk:SYNC:CID <integer>
 [:SENSe]:EVM:DLINk:SYNC:CID?
 [:SENSe]:EVM:DLINk:SYNC:CID:AUTO OFF|ON|0|1
 [:SENSe]:EVM:DLINk:SYNC:CID:AUTO?
 Example EVM:DLIN:SYNC:CID 0
 EVM:DLIN:SYNC:CID:AUTO ON
 Preset 0
 ON
 State Saved Saved in instrument state.
 Min 0
 Max 503
 Test MIN/MAX/DEF No
 Instrument S/W Revision A.01.60 or later

Tx Antenna

This key brings up a menu of Tx Antenna parameters

Key Path **Meas Setup**
 Mode LTE
 Instrument S/W Revision A.01.60 or later

Num TX Antenna This key allows you to select the number of TX Antennas to use.

Key Path **Meas Setup, Sync/Format Setup**
 Mode LTE
Remote Command [:SENSe]:EVM:DLINk:SYNC:ANTenna:NUMBER ANT1|ANT2|ANT4
 [:SENSe]:EVM:DLINk:SYNC:ANTenna:NUMBER?

Example	EVM:DLIN:SYNC:ANT:NUMB ANT1
Preset	ANT1
State Saved	Saved in instrument state.
Range	Antenna 1 Antenna 2 Antenna 4
Instrument S/W Revision	A.01.60 or later

Antenna 1 Selects one TX Antenna.

Key Path	Meas Setup, Sync/Format Setup, TX Antenna, Num Tx Antenna
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Antenna 2 Selects two TX Antennas.

Key Path	Meas Setup, Sync/Format Setup, TX Antenna, Num Tx Antenna
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Antenna 4 Selects four TX Antennas.

Key Path	Meas Setup, Sync/Format Setup, TX Antenna, Num Tx Antenna
Mode	LTE
Instrument S/W Revision	A.01.60 or later

TX Antenna Port This key allows you to select the TX Antenna port to use.

Key Path	Meas Setup, Sync/Format Setup, TX Antenna
Mode	LTE

Remote Command [:SENSE] :EVM:DLINK:SYNC:ANTenna:PORT P0 | P1 | P2 | P3
 [:SENSE] :EVM:DLINK:SYNC:ANTenna:PORT?

Example EVM:DLIN:SYNC:ANT:PORT P0

Dependencies/Couplings When Num TX Antenna is One, only Port 0 is enabled and the other are disabled. When Num TX Antenna is two, Port 0 and Port One are enabled and the others are disabled. When Num TX Antenna is four, all Ports are enabled.

Preset	P0
State Saved	Saved in instrument state.
Range	Port 0 Port 1 Port 2 Port 3

Instrument S/W Revision A.01.60 or later

Port 0 Selects Port 0 for the TX Antenna Port.

Key Path **Meas Setup, Sync/Format Setup, TX Antenna, TX Antenna Port**
 Mode LTE
 Instrument S/W Revision A.01.60 or later

Port 1 Selects Port 1 for the TX Antenna Port.

Key Path **Meas Setup, Sync/Format Setup, TX Antenna, TX Antenna Port**
 Mode LTE
 Instrument S/W Revision A.01.60 or later

Port 2 Selects Port 2 for the TX Antenna Port.

Key Path **Meas Setup, Sync/Format Setup, TX Antenna, TX Antenna Port**
 Mode LTE
 Instrument S/W Revision A.01.60 or later

Port 3 Selects Port 3 for the TX Antenna Port.

Key Path **Meas Setup, Sync/Format Setup, TX Antenna, TX Antenna Port**
 Mode LTE
 Instrument S/W Revision A.01.60 or later

Antenna Detect Threshold This key allows you to set the Antenna Detect Threshold.

Key Path **Meas Setup, Sync/Format Setup, TX Antenna,**
 Mode LTE
Remote Command [:SENSe]:EVM:DLINK:SYNC:ANTenna:DETECT:THRESHold
 <rel_ampl>
 [:SENSe]:EVM:DLINK:SYNC:ANTenna:DETECT:THRESHold?
 Example EVM:DLIN:SYNC:ANT:DET:THR -10
 Dependencies/Couplings This parameter is disabled when Num TX Antenna is One.
 Preset -10
 State Saved Saved in instrument state.
 Min -100 dB

Max	100 dB
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Tx Diversity MIMO

This key brings up a menu which allows setting the MIMO parameters.

Key Path	Meas Setup, Sync/Format Setup, More
Mode	LTE
Dependencies/Couplings	When Num TX Antenna is one, this menu link is disabled.
Instrument S/W Revision	A.01.60 or later

Control Channel Precoding This key determines the Control Channel Precoding used.

Key Path	Meas Setup, Sync/Format Setup, More, Tx Diversity MIMO
Mode	LTE
Remote Command	[:SENSe] :EVM:DLINK:SYNC:MIMO:CCPRcoding OFF TXDiversity [:SENSe] :EVM:DLINK:SYNC:MIMO:CCPRcoding?
Example	EVM:DLIN:SYNC:MIMO:CCPR OFF
Dependencies/Couplings	When Num TX Antenna is one, this parameter is disabled.
Preset	OFF
State Saved	Saved in instrument state.
Range	Off Tx Diversity
Instrument S/W Revision	A.01.60 or later

Off Turns of Control Channel Precoding.

Key Path	Meas Setup, Sync/Format Setup, More, Tx Diversity MIMO, Control Chan Precoding
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Tx Diversity Selects Tx Diversity for Control Channel Precoding.

Key Path	Meas Setup, Sync/Format Setup, More, Tx Diversity MIMO, Control Chan Precoding
Mode	LTE

Instrument S/W Revision A.01.60 or later

Shared Channel Precoding This key determines the Shared Channel Precoding used.

Key Path	Meas Setup, Sync/Format Setup, More, Tx Diversity MIMO
Mode	LTE
Remote Command	[:SENSe] :EVM:DLINk:SYNC:MIMO:SCPRecoding OFF TXDiversity [:SENSe] :EVM:DLINk:SYNC:MIMO:SCPRecoding?
Example	EVM:DLIN:SYNC:MIMO:SCPR OFF
Dependencies/Couplings	When Num TX Antenna is one, this parameter is disabled.
Preset	OFF
State Saved	Saved in instrument state.
Range	Off Tx Diversity
Instrument S/W Revision	A.01.60 or later

Off Turns of Shared Channel Precoding.

Key Path	Meas Setup, Sync/Format Setup, More, Tx Diversity MIMO, Shared Chan Precoding
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Tx Diversity Selects Tx Diversity for Shared Channel Precoding.

Key Path	Meas Setup, Sync/Format Setup, More, Tx Diversity MIMO, Shared Chan Precoding
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Sync/Format Setup (Uplink)

This key brings up a menu of commonly used sync/format setup parameters when Direction (refer to PD Mode - LTE) is set to Uplink.

Key Path	Meas Setup
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Sync Type

This key allows you to select the Sync Type to use.

Key Path	Meas Setup, Sync/Format Setup, More
Mode	LTE
Remote Command	[:SENSE] :EVM:ULINK:SYNC:TYPE RS PUCCh [:SENSE] :EVM:ULINK:SYNC:TYPE?
Example	EVM:ULIN:SYNC:TYPE RS
Notes	This parameter applies to both Downlink and Uplink
Dependencies/Couplings	When n RB PUCCH is set 0 PUCCh will be disabled. When n RB PUCCH is set to the max number of RB's RS will be disabled.
Preset	RS
State Saved	Saved in instrument state.
Range	PUSCH DM-RS PUCCH DM-RS
Instrument S/W Revision	A.01.60 or later

PUSCH DM-RS Selects PUSCH DM-RS as the Sync Type.

Key Path	Meas Setup, Sync/Format Setup, More, Sync Type
Mode	LTE
Instrument S/W Revision	A.01.60 or later

PUCCH DM-RS Selects PUCCH DM-RS as the Sync Type.

Key Path	Meas Setup, Sync/Format Setup, More, Sync Type
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Cyclic Prefix Length

This key allows you to select whether to automatically detect the cyclic prefix length or specify the cyclic prefix length.

Key Path	Meas Setup, Sync/Format Setup
Mode	LTE
Remote Command	[:SENSE] :EVM:ULINK:SYNC:CPLength AUTO NORMAl EXTended [:SENSE] :EVM:ULINK:SYNC:CPLength?

Example	EVM:ULIN:SYNC:CPL AUTO
Notes	This parameter applies to both Downlink and Uplink
Preset	AUTO
State Saved	Saved in instrument state.
Range	Auto Normal Extended
Instrument S/W Revision	A.01.60 or later

Auto Selects Auto Cyclic Prefix Length.

Key Path	Meas Setup, Sync/Format Setup, Cyclic Prefix Length
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Normal Selects Normal Cyclic Prefix Length.

Key Path	Meas Setup, Sync/Format Setup, Cyclic Prefix Length
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Extended Selects Extended Cyclic Prefix Length.

Key Path	Meas Setup, Sync/Format Setup, Cyclic Prefix Length
Mode	LTE
Instrument S/W Revision	A.01.60 or later

IQ Offset Compensate

This key allows you to set the state of IQ Offset Compensate.

Key Path	Meas Setup, Sync/Format Setup
Mode	LTE
Remote Command	[:SENSE] :EVM:ULINK:SYNC:IQOCmp OFF ON 0 1 [:SENSE] :EVM:ULINK:SYNC:IQOCmp?
Example	EVM:ULIN:SYNC:IQOC OFF
Preset	OFF
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Half Subcarrier Shift

This key allows you to set the state of Half Carrier Shift.

Key Path	Meas Setup, Sync/Format Setup
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:SYNC:HSShift OFF ON 0 1 [:SENSe] :EVM:ULINK:SYNC:HSShift?
Example	EVM:ULIN:SYNC:HSSH ON
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

PUSCH DFT Swap

This key allows you to set the state of PUSCH DFT Swap.

Key Path	Meas Setup, Sync/Format Setup
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:SYNC:PDSwap OFF ON 0 1 [:SENSe] :EVM:ULINK:SYNC:PDSwap?
Example	EVM:ULIN:SYNC:PDSW ON
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Meas Time Setup

This key brings up a menu of commonly used meas time setup parameters.

Key Path	Meas Setup
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Result Length

This key allows you to set the maximum length of the analysis.

Key Path	Meas Setup, Meas Time Setup
Mode	LTE

Remote Command	[:SENSE]:EVM:TIME:RESult:LENGth <integer> [:SENSE]:EVM:TIME:RESult:LENGth?
Example	EVM:TIME:RES:LENG 20
Preset	20 slots
State Saved	Saved in instrument state.
Min	1 slot
Max	20 slots
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Meas Offset Slot

This key allows you to set the Meas Offset Slot.

Key Path	Meas Setup, Meas Time Setup
Mode	LTE
Remote Command	[:SENSE]:EVM:TIME:OFFSet:SLOT <integer> [:SENSE]:EVM:TIME:OFFSet:SLOT?
Example	EVM:TIME:OFFS:SLOT 0
Dependencies/Couplings	Max value determined by Result Length (refer to Result Length)
Preset	0 slots
State Saved	Saved in instrument state.
Min	0 slots
Max	Determined by Result Length (refer to REF_Ref187828345 \h *CHARFORMAT -)
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Meas Offset Symbol

This key allows you to set the Meas Offset Symbol.

Key Path	Meas Setup, Meas Time Setup
Mode	LTE
Remote Command	[:SENSE]:EVM:TIME:OFFSet:SYMBol <integer> [:SENSE]:EVM:TIME:OFFSet:SYMBol?
Example	EVM:TIME:OFFS:SYMB 0

Preset	0 symbols
State Saved	Saved in instrument state.
Min	0 symbols
Max	6 symbols
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Meas Interval Slot

This key allows you to set the Meas Interval Slot.

Key Path	Meas Setup, Meas Time Setup
Mode	LTE
Remote Command	[:SENSE] :EVM:TIME:INTerval:SLOT <integer> [:SENSE] :EVM:TIME:INTerval:SLOT?
Example	EVM:TIME:INT:SLOT 1
Dependencies/Couplings	Max value determined by Result Length (refer to Result Length)
Preset	2 slots
State Saved	Saved in instrument state.
Min	0 slots
Max	Determined by Result Length (refer to REF _Ref187828345 \h *CHARFORMAT -)
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Meas Interval Symbol

This key allows you to set the Meas Interval Symbol.

Key Path	Meas Setup, Meas Time Setup
Mode	LTE
Remote Command	[:SENSE] :EVM:TIME:INTerval:SYMBOL <integer> [:SENSE] :EVM:TIME:INTerval:SYMBOL?
Example	EVM:TIME:INT:SYMB 0
Preset	0 symbols
State Saved	Saved in instrument state.
Min	0 symbols

Max	6 symbols
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Analysis Start Boundary

This key allows you to set the Analysis Start Boundary.

Key Path	Meas Setup, Meas Time Setup
Mode	LTE
Remote Command	[:SENSe] :EVM:TIME:ASBoundary FRAME HALF SUB SLOT [:SENSe] :EVM:TIME:ASBoundary?
Example	EVM:TIME:ASB FRAM
Preset	FRAMe
State Saved	Saved in instrument state.
Range	Frame Half Frame Sub Frame Slot
Instrument S/W Revision	A.01.60 or later

Frame Selects Frame as Analysis Start Boundary.

Key Path	Meas Setup, Meas Time Setup, Analysis Start Boundary
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Half-Frame Selects Half-Frame as Analysis Start Boundary.

Key Path	Meas Setup, Meas Time Setup, Analysis Start Boundary
Mode	LTE
Instrument S/W Revision	A.01.60 or later

SubFrame Selects SubFrame as Analysis Start Boundary.

Key Path	Meas Setup, Meas Time Setup, Analysis Start Boundary
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Slot Selects Slot as Analysis Start Boundary.

Key Path	Meas Setup, Meas Time Setup, Analysis Start Boundary
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Chan Profile Setup (Downlink)

This key brings up a menu of commonly used chan profile setup parameters when (refer to PD Mode - LTE) is set Downlink.

Key Path	Meas Setup
Mode	LTE
Instrument S/W Revision	A.01.60 or later

RB Auto Detect

This key determines whether the User channels should be auto detected.

Key Path	Meas Setup, Chan Profile Setup
Mode	LTE
Remote Command	<code>[:SENSE] :EVM:PROFile:AUTO:DETECT OFF ON 0 1</code> <code>[:SENSE] :EVM:PROFile:AUTO:DETECT?</code>

Example **EVM:PROF:DET ON**

Dependencies/Couplings **None**

This parameter is same for Downlink and Uplink

When Direction is Downlink, this parameter is coupled to the Include User (Downlink) menu. This menu is context sensitive and when Auto Include is on the user can choose to include QPSK, 16QAM or 64QAM channels. When Off the user can choose to include any of the user defined PDSCH channels.

When direction is Uplink, this parameter is coupled to the Include User (Uplink) menu. This menu is context sensitive and when Auto Include is On the user can choose to include channels from the Auto Detected User. When Off the user can choose to include channels from ONE of the user defined Users.

Preset **ON**

State Saved **Saved in instrument state.**

Instrument S/W Revision **A.01.60 or later**

Composite Include

This key brings up a menu which allows the inclusion or exclusion of all channels.

Key Path	Meas Setup, Chan Profile Setup
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Include All This key turns On all Downlink channels.

Key Path	Meas Setup, Chan Profile Setup, Composite Include
Mode	LTE
Remote Command	[:SENSE] :EVM:DLINK:PROFile:INCLude:ALL
Example	EVM:DLIN:PROF:INCL:ALL
Dependencies/Couplings	Turns On the following parameters Include P-SCH Include S-SCH Include PBCH Include PCFICH Include PHICH Include RS Include PDCCH All Users under the Include Users (Downlink) Menu
Instrument S/W Revision	A.01.60 or later

Exclude All This key turns Off all Downlink channels.

Key Path	Meas Setup, Chan Profile Setup, Composite Include
Mode	LTE
Remote Command	[:SENSE] :EVM:DLINK:PROFile:EXCLude:ALL
Example	EVM:DLIN:PROF:EXCL:ALL

Dependencies/Couplings	Turns Off the following parameters Include P-SCH Include S-SCH Include PBCH Include PCFICH Include PHICH Include RS Include PDCCH Include Non Allocation All Users under the Include Users (Downlink) Menu
Instrument S/W Revision	A.01.60 or later

Include P-SS

This key allows you to determine whether the Primary Synchronization Channel is included in the results.

Key Path	Meas Setup, Chan Profile Setup
Mode	LTE
Remote Command	[:SENSE] :EVM:DLINK:PROFile:PSS INCLude EXCLude [:SENSE] :EVM:DLINK:PROFile:PSS?
Example	EVM:DLIN:PROF:PSS INCL
Dependencies/Couplings	This parameter will be set to Include when Downlink Include All is selected and set to Exclude when Downlink Exclude All is selected.
Preset	INCLude
State Saved	Saved in instrument state.
Range	Include Exclude
Instrument S/W Revision	A.01.60 or later

Include S-SS

This key allows you to determine whether the Secondary Synchronization Channel is included in the results.

Key Path	Meas Setup, Chan Profile Setup
Mode	LTE
Remote Command	[:SENSE] :EVM:DLINK:PROFile:SSS INCLude EXCLude [:SENSE] :EVM:DLINK:PROFile:SSS?

Example	EVM:DLIN:PROF:SSS INCL
Dependencies/Couplings	This parameter will be set to Include when Downlink Include All is selected and set to Exclude when Downlink Exclude All is selected.
Preset	INCLude
State Saved	Saved in instrument state.
Range	Include Exclude
Instrument S/W Revision	A.01.60 or later

Include PBCH

This key allows you to determine whether the PBCH is included in the results.

Key Path	Meas Setup, Chan Profile Setup
Mode	LTE
Remote Command	[:SENSE]:EVM:DLINK:PROfile:PBCH INCLude EXCLude [:SENSE]:EVM:DLINK:PROfile:PBCH?

Example	EVM:DLIN:PROF:PBCH INCL
Dependencies/Couplings	This parameter will be set to Include when Downlink Include All is selected and set to Exclude when Downlink Exclude All is selected.
Preset	INCLude
State Saved	Saved in instrument state.
Range	Include Exclude
Instrument S/W Revision	A.01.60 or later

Include PCFICH

This key allows you to determine whether the PCFICH is included in the results.

Key Path	Meas Setup, Chan Profile Setup, More
Mode	LTE
Remote Command	[:SENSE]:EVM:DLINK:PROfile:PCFich INCLude EXCLude [:SENSE]:EVM:DLINK:PROfile:PCFich?

Example	EVM:DLIN:PROF:PCF INCL
Dependencies/Couplings	This parameter will be set to Include when Downlink Include All is selected and set to Exclude when Downlink Exclude All is selected.
Preset	INCLude
State Saved	Saved in instrument state.

Range	Include Exclude
Instrument S/W Revision	A.01.60 or later

Include PHICH

This key allows you to determine whether the PHICH is included in the results.

Key Path	Meas Setup, Chan Profile Setup, More
Mode	LTE
Remote Command	[:SENSe] :EVM:DLINK:PROFfile:PHICH INCLude EXCLude [:SENSe] :EVM:DLINK:PROFfile:PHICH?
Example	EVM:DLIN:PROF:PHIC INCL
Dependencies/Couplings	This parameter will be set to Include when Downlink Include All is selected and set to Exclude when Downlink Exclude All is selected.
Preset	INCLude
State Saved	Saved in instrument state.
Range	Include Exclude
Instrument S/W Revision	A.01.60 or later

Include RS

This key allows you to determine whether the RS is included in the results.

Key Path	Meas Setup, Chan Profile Setup, More
Mode	LTE
Remote Command	[:SENSe] :EVM:DLINK:PROFfile:RS INCLude EXCLude [:SENSe] :EVM:DLINK:PROFfile:RS?
Example	EVM:DLIN:PROF:RS INCL
Dependencies/Couplings	This parameter will be set to Include when Downlink Include All is selected and set to Exclude when Downlink Exclude All is selected.
Preset	INCLude
State Saved	Saved in instrument state.
Range	Include Exclude
Instrument S/W Revision	A.01.60 or later

Include PDCCH

This key allows you to determine whether the PDCCH is included in the results.

Key Path	Meas Setup, Chan Profile Setup, More
Mode	LTE
Remote Command	[:SENSE]:EVM:DLINK:PROFile:PDCCh INCLude EXCLude [:SENSE]:EVM:DLINK:PROFile:PDCCh?
Example	EVM:DLIN:PROF:PDC INCL
Dependencies/Couplings	This parameter will be set to Include when Downlink Include All is selected and set to Exclude when Downlink Exclude All is selected.
Preset	INCLude
State Saved	Saved in instrument state.
Range	Include Exclude
Instrument S/W Revision	A.01.60 or later

Include Non Allocation

This key allows you to determine whether inactive signals are included in the results.

Key Path	Meas Setup, Chan Profile Setup, More
Mode	LTE
Remote Command	[:SENSE]:EVM:PROFile:NALLocation INCLude EXCLude [:SENSE]:EVM:PROFile:NALLocation?
Example	EVM:PROF:NALL EXCL
Dependencies/Couplings	This parameter is same for Downlink and Uplink When either Downlink Exclude All or Uplink Exclude All is selected, this parameter is set to Exclude.
Preset	EXCLude
State Saved	Saved in instrument state.
Range	Include Exclude
Instrument S/W Revision	A.01.60 or later

Include Users

This key brings up a menu which allows the user to determine which PDSCH channels should be included in the results.

Key Path	Meas Setup, Chan Profile Setup, More
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Mode LTE
Instrument S/W Revision A.01.60 or later

Include QPSK This key allows you to include channels using QPSK Mod Type in the results.

Key Path **Meas Setup, Chan Profile Setup, Include Users**
Mode LTE
Remote Command [:SENSe]:EVM:DLINK:PROFile:QPSK INCLude|EXCLude
 [:SENSe]:EVM:DLINK:PROFile:QPSK?
Example EVM:DLIN:PROF:QPSK INCL
Dependencies/Couplings This parameter will only be available and displayed on the Include Users softpanel when PDSCH Auto Detect is On.
 This parameter will be set to Include when Downlink Include All is selected and set to OFF when Downlink Exclude All is selected.
Preset INCLude
State Saved Saved in instrument state.
Range Include | Exclude
Instrument S/W Revision A.01.60 or later

Include 16QAM This key allows you to include channels using 16QAM Mod Type in the results.

Key Path **Meas Setup, Chan Profile Setup, Include Users**
Mode LTE
Remote Command [:SENSe]:EVM:DLINK:PROFile:QAM16 INCLude|EXCLude
 [:SENSe]:EVM:DLINK:PROFile:QAM16?
Example EVM:DLIN:PROF:QAM16 INCL
Dependencies/Couplings This parameter will only be available and displayed on the Include Users softpanel when PDSCH Auto Detect is On.
 This parameter will be set to Include when Downlink Include All is selected and set to OFF when Downlink Exclude All is selected.
Preset INCLude
State Saved Saved in instrument state.
Range Include | Exclude
Instrument S/W Revision A.01.60 or later

Include 64QAM This key allows you to include channels using 64QAM Mod Type in the results.

Key Path	Meas Setup, Chan Profile Setup, Include Users
Mode	LTE
Remote Command	[:SENSe]:EVM:DLINk:PROFile:QAM64 INCLude EXCLude [:SENSe]:EVM:DLINk:PROFile:QAM64?
Example	EVM:DLIN:PROF:QAM64 INCL
Dependencies/Couplings	This parameter will only be available and displayed on the Include Users softpanel when Downlink Auto Detect is On. This parameter will be set to Include when Downlink Include All is selected and set to OFF when Downlink Exclude All is selected.
Preset	INCLude
State Saved	Saved in instrument state.
Range	Include Exclude
Instrument S/W Revision	A.01.60 or later

User This key is used to index the currently defined Users.

Key Path	Meas Setup, Chan Profile Setup, Include Users
Mode	LTE
Dependencies/Couplings	Max value determined by the number of Users the user has configured
Preset	0
State Saved	Saved in instrument state.
Min	1
Max	Determined by the number of Users the user has configured
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Include PDSCH This key allows you to include the user defined channel PDSCH in the results.

Key Path	Meas Setup, Chan Profile Setup, Include Users
Mode	LTE

Remote Command	[:SENSe] :EVM:DLINk:PROFile:USER<n>:PDSCh INCLude EXCLude [:SENSe] :EVM:DLINk:PROFile:USER<n>:PDSCh?
Example	EVM:DLIN:PROF:USER1:PDSC EXCL
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message. This parameter will only be available and displayed on the Include Users softpanel when Downlink Auto Detect is Off. This parameter will be set to Include when Downlink Include All is selected and set to OFF when Downlink Exclude All is selected.
Preset	EXCLude
State Saved	Saved in instrument state.
Range	Include Exclude
Instrument S/W Revision	A.01.60 or later

Edit Control Channels

The key brings up a Dialog which enables the user to edit the Downlink Control Channel parameters. Each parameter on the Dialog has a corresponding softpanel which will be displayed when the parameter is selected.

Key Path	Meas Setup, Chan Profile Setup, More, More
Mode	LTE
Instrument S/W Revision	A.01.60 or later

P-SCH Power Boost This key allows you to set the Power Boost value for the P-SCH.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels, P-SS
Mode	LTE
Remote Command	[:SENSe] :EVM:DLINk:PROFile:PSS:PWRBoost <rel_ampl> [:SENSe] :EVM:DLINk:PROFile:PSS:PWRBoost?
Example	EVM:DLIN:PROF:PSS:PWRB 0.65
Preset	0.65 dB
State Saved	Saved in instrument state.
Min	-100 dB
Max	100 dB

Test MIN/MAX/DEF No
 Instrument S/W Revision A.01.60 or later

S-SS Power Boost This key allows you to set the Power Boost value for the S-SS.

Key Path **Meas Setup, Chan Profile Setup, Edit Control Channels, S-SS**
 Mode LTE
Remote Command [:SENSe]:EVM:DLINk:PROFile:SSS:PWRBoost <rel_ampl>
 [:SENSe]:EVM:DLINk:PROFile:SSS:PWRBoost?
 Example EVM:DLIN:PROF:SSS:PWRB 0.65
 Preset 0.65 dB
 State Saved Saved in instrument state.
 Min -100 dB
 Max 100 dB
 Test MIN/MAX/DEF No
 Instrument S/W Revision A.01.60 or later

PBCH Power Boost This key allows you to set the Power Boost value for the PBCH.

Key Path **Meas Setup, Chan Profile Setup, Edit Control Channels, PBCH**
 Mode LTE
Remote Command [:SENSe]:EVM:DLINk:PROFile:PBCH:PWRBoost <rel_ampl>
 [:SENSe]:EVM:DLINk:PROFile:PBCH:PWRBoost?
 Example EVM:DLIN:PROF:PBCH:PWRB 0
 Preset 0 dB
 State Saved Saved in instrument state.
 Min -100 dB
 Max 100 dB
 Test MIN/MAX/DEF No
 Instrument S/W Revision A.01.60 or later

PCFICH Power Boost This key allows you to set the Power Boost value for the PCFICH.

Key Path **Meas Setup, Chan Profile Setup, Edit Control Channels, PCFICH**
 Mode LTE

Remote Command	<code>[:SENSe] :EVM:DLINk:PROFile:PCFich:PWRBoost <rel_ampl></code> <code>[:SENSe] :EVM:DLINk:PROFile:PCFich:PWRBoost?</code>
Example	<code>EVM:DLIN:PROF:PCF:PWRB 0</code>
Preset	0 dB
State Saved	Saved in instrument state.
Min	-100 dB
Max	100 dB
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

RS Power Boost This key allows you to set the Power Boost value for the RS.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels, RS
Mode	LTE
Remote Command	<code>[:SENSe] :EVM:DLINk:PROFile:RS:PWRBoost <rel_ampl></code> <code>[:SENSe] :EVM:DLINk:PROFile:RS:PWRBoost?</code>
Example	<code>EVM:DLIN:PROF:RS:PWRB 2.50</code>
Preset	2.50 dB
State Saved	Saved in instrument state.
Min	-100 dB
Max	100 dB
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

PDCCH This key brings up a menu which allows the configuration of PDCCH parameters.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels
Mode	LTE
Instrument S/W Revision	A.01.60 or later

PDCCH Power Boost This key allows you to set the Power Boost value for the PDCCH.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels, PDCCH
Mode	LTE

Remote Command	[:SENSE]:EVM:DLINK:PROFile:PDCCCh:PWRBoost <rel_ampl> [:SENSE]:EVM:DLINK:PROFile:PDCCCh:PWRBoost?
Example	EVM:DLIN:PROF:PDCC:PWRB 0
Preset	0 dB
State Saved	Saved in instrument state.
Min	-100 dB
Max	100 dB
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

PDCCH Allocation Constant This key determines whether all the Subframes will use PDCCH Allocation Subframe 0 value.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels, PDCCH Alloc
Mode	LTE

Remote Command	[:SENSE]:EVM:DLINK:PROFile:PDCCCh:ALLocation:CONStant OFF ON 0 1 [:SENSE]:EVM:DLINK:PROFile:PDCCCh:ALLocation:CONStant?
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Example	EVM:DLIN:PROF:PDCC:ALL:CONS ON
Dependencies/Couplings	When this parameter is On, all Subframes will use PDCCH Allocation Subframe 0 value.
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

PDCCH Allocation Subframe 0 This key allows you to enter the PDCCH Allocation (Symbols per Subframe) for Subframe 0.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels, PDCCH Alloc
Mode	LTE

Remote Command	[:SENSE]:EVM:DLINK:PROFile:PDCCCh:ALLocation:SUBFrame0:SYMBOLs <integer> [:SENSE]:EVM:DLINK:PROFile:PDCCCh:ALLocation:SUBFrame0:SYMBOLs?
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Example	EVM:DLIN:PROF:PDCC:ALL:SUBF0:SYMB 1
Dependencies/Couplings	When PDCCH Allocation Constant is On, all subframes will use this value.

Preset	3
State Saved	Saved in instrument state.
Min	0
Max	3
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

PDCCH Allocation Subframe 1 This key allows you to enter the PDCCH Allocation (Symbols per Subframe) for Subframe 1.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels, PDCCH Alloc
Mode	LTE
Remote Command	[:SENSe]:EVM:DLINK:PROFile:PDCCh:ALLocation:SUBFrame1:SYMBOLs <integer> [:SENSe]:EVM:DLINK:PROFile:PDCCh:ALLocation:SUBFrame1:SYMBOLs?
Example	EVM:DLIN:PROF:PDCC:ALL:SUBF1:SYMB 1
Dependencies/Couplings	This parameter is disabled when PDCCH Allocation Constant is On.
Preset	3
State Saved	Saved in instrument state.
Min	0
Max	3
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

PDCCH Allocation Subframe 2 This key allows you to enter the PDCCH Allocation (Symbols per Subframe) for Subframe 2.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels, PDCCH Alloc
Mode	LTE
Remote Command	[:SENSe]:EVM:DLINK:PROFile:PDCCh:ALLocation:SUBFrame2:SYMBOLs <integer> [:SENSe]:EVM:DLINK:PROFile:PDCCh:ALLocation:SUBFrame2:SYMBOLs?
Example	EVM:DLIN:PROF:PDCC:ALL:SUBF2:SYMB 1

Dependencies/Couplings	This parameter is disabled when PDCCH Allocation Constant is On.
Preset	3
State Saved	Saved in instrument state.
Min	0
Max	3
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

PDCCH Allocation Subframe 3 This key allows you to enter the PDCCH Allocation (Symbols per Subframe) for Subframe 3.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels, PDCCH Alloc
Mode	LTE
Remote Command	[:SENSE] :EVM:DLINK:PROfile:PDCCh:ALLocation:SUBFrame3:SYMBOLs <integer> [:SENSE] :EVM:DLINK:PROfile:PDCCh:ALLocation:SUBFrame3:SYMBOLs?
Example	EVM:DLIN:PROF:PDCC:ALL:SUBF3:SYMB 1
Dependencies/Couplings	This parameter is disabled when PDCCH Allocation Constant is On.
Preset	3
State Saved	Saved in instrument state.
Min	0
Max	3
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

PDCCH Allocation Subframe 4 This key allows you to enter the PDCCH Allocation (Symbols per Subframe) for Subframe 4.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels, PDCCH Alloc
Mode	LTE
Remote Command	[:SENSE] :EVM:DLINK:PROfile:PDCCh:ALLocation:SUBFrame4:SYMBOLs <integer> [:SENSE] :EVM:DLINK:PROfile:PDCCh:ALLocation:SUBFrame4:SYMBOLs?

Example	EVM:DLIN:PROF:PDCC:ALL:SUBF4:SYMB 1
Dependencies/Couplings	This parameter is disabled when PDCCH Allocation Constant is On.
Preset	3
State Saved	Saved in instrument state.
Min	0
Max	3
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

PDCCH Allocation Subframe 5 This key allows you to enter the PDCCH Allocation (Symbols per Subframe) for Subframe 5.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels, PDCCH Alloc
Mode	LTE
Remote Command	[:SENSe] :EVM:DLINk:PROFfile:PDCCCh:ALLocation:SUBFrame5:SYMBOLs <integer> [:SENSe] :EVM:DLINk:PROFfile:PDCCCh:ALLocation:SUBFrame5:SYMBOLs?
Example	EVM:DLIN:PROF:PDCC:ALL:SUBF5:SYMB 1
Dependencies/Couplings	This parameter is disabled when PDCCH Allocation Constant is On.
Preset	3
State Saved	Saved in instrument state.
Min	0
Max	3
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

PDCCH Allocation Subframe 6 This key allows you to enter the PDCCH Allocation (Symbols per Subframe) for Subframe 6.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels, PDCCH Alloc
Mode	LTE

Remote Command	[:SENSe]:EVM:DLINk:PROFile:PDCCh:ALLocation:SUBFrame6:SYMBOLs <integer> [:SENSe]:EVM:DLINk:PROFile:PDCCh:ALLocation:SUBFrame6:SYMBOLs?
Example	EVM:DLIN:PROF:PDCC:ALL:SUBF6:SYMB 1
Dependencies/Couplings	This parameter is disabled when PDCCH Allocation Constant is On.
Preset	3
State Saved	Saved in instrument state.
Min	0
Max	3
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

PDCCH Allocation Subframe 7 This key allows you to enter the PDCCH Allocation (Symbols per Subframe) for Subframe 7.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels, PDCCH Alloc
Mode	LTE
Remote Command	[:SENSe]:EVM:DLINk:PROFile:PDCCh:ALLocation:SUBFrame7:SYMBOLs <integer> [:SENSe]:EVM:DLINk:PROFile:PDCCh:ALLocation:SUBFrame7:SYMBOLs?
Example	EVM:DLIN:PROF:PDCC:ALL:SUBF7:SYMB 1
Dependencies/Couplings	This parameter is disabled when PDCCH Allocation Constant is On.
Preset	3
State Saved	Saved in instrument state.
Min	0
Max	3
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

PDCCH Allocation Subframe 8 This key allows you to enter the PDCCH Allocation (Symbols per Subframe) for Subframe 8.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels, PDCCH Alloc
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Mode	LTE
Remote Command	[:SENSe] :EVM:DLINK:PROFile:PDCCh:ALLocation:SUBFrame8:SYMBOLs <integer> [:SENSe] :EVM:DLINK:PROFile:PDCCh:ALLocation:SUBFrame8:SYMBOLs?
Example	EVM:DLIN:PROF:PDCC:ALL:SUBF8:SYMB 1
Dependencies/Couplings	This parameter is disabled when PDCCH Allocation Constant is On.
Preset	3
State Saved	Saved in instrument state.
Min	0
Max	3
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

PDCCH Allocation Subframe 9 This key allows you to enter the PDCCH Allocation (Symbols per Subframe) for Subframe 9.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels, PDCCH Alloc
Mode	LTE
Remote Command	[:SENSe] :EVM:DLINK:PROFile:PDCCh:ALLocation:SUBFrame9:SYMBOLs <integer> [:SENSe] :EVM:DLINK:PROFile:PDCCh:ALLocation:SUBFrame9:SYMBOLs?
Example	EVM:DLIN:PROF:PDCC:ALL:SUBF9:SYMB 1
Dependencies/Couplings	This parameter is disabled when PDCCH Allocation Constant is On.
Preset	3
State Saved	Saved in instrument state.
Min	0
Max	3
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

PHICH This key brings up a menu which allows the configuration of PHICH parameters.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels
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Mode LTE
Instrument S/W Revision A.01.60 or later

PHICH Power Boost This key allows you to set the Power Boost value for the PHICH.

Key Path **Meas Setup, Chan Profile Setup, Edit Control Channels, PHICH**
 Mode LTE
Remote Command [:SENSe]:EVM:DLINK:PROfile:PHICH:PWRBoost <rel_amp1>
 [:SENSe]:EVM:DLINK:PROfile:PHICH:PWRBoost?
 Example EVM:DLIN:PROF:PHIC:PWRB 0
 Preset 0 dB
 State Saved Saved in instrument state.
 Min -100 dB
 Max 100 dB
 Test MIN/MAX/DEF No
 Instrument S/W Revision A.01.60 or later

Despread IQ Orthogonal Sequence Index Determines the state of Despread IQ Orthogonal Sequence Index.

Key Path **Meas Setup, Chan Profile Setup, Edit Control Channels, PHICH**
 Mode LTE
Remote Command [:SENSe]:EVM:DLINK:PROfile:PHICH:DESPread OFF|ON|0|1
 [:SENSe]:EVM:DLINK:PROfile:PHICH:DESPread?
 Example EVM:DLIN:PROF:PHIC:DESP OFF
 Preset OFF
 State Saved Saved in instrument state.
 Instrument S/W Revision A.01.60 or later

PHICH Allocation Determines the Ng value used in computing the number of resource element groups.

Key Path **Meas Setup, Chan Profile Setup, Edit Control Channels, PHICH Allocation**
 Mode LTE
Remote Command [:SENSe]:EVM:DLINK:PROfile:PHICH:ALlocation:RATio
 R1BY6|R1BY2|R1|R2
 [:SENSe]:EVM:DLINK:PROfile:PHICH:ALlocation:RATio?

Example	EVM:DLIN:PROF:PHIC:ALL:RAT R1
Preset	R1
State Saved	Saved in instrument state.
Range	Ng 1/6 Ng 1/2 Ng 1 Ng 2
Instrument S/W Revision	A.01.60 or later

Ng 1/6 Selects 1/6 for the Ng value used in computing the number of resource element groups.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels, PHICH Allocation
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Ng 1/2 Selects 1/2 for the Ng value used in computing the number of resource element groups.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels, PHICH Allocation
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Ng 1 Selects 1 for the Ng value used in computing the number of resource element groups.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels, PHICH Allocation
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Ng 2 Selects 2 for the Ng value used in computing the number of resource element groups.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels, PHICH Allocation
Mode	LTE
Instrument S/W Revision	A.01.60 or later

PHICH Duration Determines the number of symbols used in each PHICH subframe.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels, PHICH Duration
Mode	LTE

Remote Command [:SENSe]:EVM:DLINK:PROFile:PHICH:DURation
NORMal | EXTended
[:SENSe]:EVM:DLINK:PROFile:PHICH:DURation?

Example :EVM:DLIN:PROF:PHIC:DUR NORM

Preset	NORMal
State Saved	Saved in instrument state.
Range	Normal Extended
Instrument S/W Revision	A.01.60 or later

Normal Selects Normal for the PHICH duration.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels, PHICH Duration
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Extended Selects Extended for the PHICH duration.

Key Path	Meas Setup, Chan Profile Setup, Edit Control Channels, PHICH Duration
Mode	LTE
Instrument S/W Revision	A.01.60 or later

OK/Cancel This key brings up a menu which allows the changes to the parameters on the Dialog to be applied or cancelled.

Mode	LTE
Instrument S/W Revision	A.01.60 or later

OK This key applies all changes made to the parameters on the Dialog then exits the Dialog.

Mode	LTE
Instrument S/W Revision	A.01.60 or later

Cancel This key cancels all changes made to the parameters on the Dialog then exits the Dialog.

Mode	LTE
Instrument S/W Revision	A.01.60 or later

Edit User Mapping

The key brings up a Dialog which enables the user to edit the Downlink channel parameters. Each parameter on the Dialog has a corresponding softpanel which will be displayed when the parameter is selected.

Key Path	Meas Setup, Chan Profile Setup, More, More
Mode	LTE

Instrument S/W Revision A.01.60 or later

Add User Adds a new and the new entry becomes the selected User. The new User will contain as default one Allocation which will have the associated parameters set to the default values.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PDSCH
Mode	LTE
Remote Command	[:SENSE] :EVM:DLINK:PROF:ADD:USER
Example	EVM:DLIN:PROF:ADD:USER
Dependencies/Couplings	The new User will be added at the end of the currently defined Users. The max number of Users is 25 and once this has been reached this parameter will be disabled.
Instrument S/W Revision	A.01.60 or later

Delete User Deletes the current selected User.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PDSCH
Mode	LTE
Remote Command	[:SENSE] :EVM:DLINK:PROF:USER<n>:DELEte
Example	EVM:DLIN:PROF:USER1:DEL
Dependencies/Couplings	This parameter will be disabled when there is only one User. The range of sub op code <n> values is determined by the number of Users the user has configured. If the user attempts to remotely delete a sub op code that is out of range this will result in an error message.
Instrument S/W Revision	A.01.60 or later

Include PDSCH This key allows you to determine whether the PDSCH is included in the results.

Key Path	Meas Setup, Chan Profile Setup, More, More, Edit User Mapping
Mode	LTE

Dependencies/Couplings	<p>This parameter provides the Include/Exclude status of the currently selected User, therefore the SCPI commands associated with this parameter will change as the User is changed.</p> <p>If RB Auto Detect is On;</p> <p>If selected User is QPSK, refer to Include QPSK</p> <p>If selected User is 16QAM, refer to Include 16QAM</p> <p>If selected User is 64QAM, refer to Include 64QAM</p> <p>If RB Auto Detect is Off, refer to Include PDSCH</p>
Preset	EXCLude
State Saved	Saved in instrument state.
Range	Include Exclude
Instrument S/W Revision	A.01.60 or later

Common Mod Type This key allows you to select the Modulation Type to be used by all the Allocations when Mod Type Couple is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, Mod Type
Mode	LTE
Remote Command	<pre>[:SENSe]:EVM:DLINK:PROfile:USER<n>:PDSch:MODulation:TYPE QPSK QAM16 QAM64</pre> <pre>[:SENSe]:EVM:DLINK:PROfile:USER<n>:PDSch:MODulation:TYPE?</pre>
Example	EVM:DLIN:PROF:USER1:PDSC:MOD:TYPE QPSK
Dependencies/Couplings	<p>The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25.</p> <p>If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.</p>
Preset	QPSK
State Saved	Saved in instrument state.
Range	QPSK QAM16 QAM64
Instrument S/W Revision	A.01.60 or later

QPSK Selects QPSK for the Modulation Type to be used by all the Allocations when Mod Type Couple is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, Mod Type
Mode	LTE
Instrument S/W Revision	A.01.60 or later

16QAM Selects 16QAM for the Modulation Type to be used by all the Allocations when Mod Type Couple is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, Mod Type
Mode	LTE
Instrument S/W Revision	A.01.60 or later

64QAM Selects 64QAM for the Modulation Type to be used by all the Allocations when Mod Type Couple is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, Mod Type
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Mod Type Couple This key determines whether all the Allocations will use the Common Mod Type value.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, Mod Type
Mode	LTE
Remote Command	[:SENSE]:EVM:DLINK:PROFile:USER<n>:PDSCh:MODulation:TYPE:COUPlE OFF ON 0 1 [:SENSE]:EVM:DLINK:PROFile:USER<n>:PDSCh:MODulation:TYPE:COUPlE?
Example	EVM:DLIN:PROF:USER1:PDSC:MOD:TYPE:COUP ON
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Common Power Boost This key allows you to select the Power Boost value to be used by all the Allocations when Power Boost Couple is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, Power Boost
Mode	LTE
Remote Command	[:SENSE]:EVM:DLINK:PROFile:USER<n>:PDSCh:PWRBoost <rel_ampl> [:SENSE]:EVM:DLINK:PROFile:USER<n>:PDSCh:PWRBoost?

Example	EVM:DLIN:PROF:USER1:PDSC:PWRB 0
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	0 dB
State Saved	Saved in instrument state.
Min	-100 dB
Max	100 dB
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Power Boost Couple This key determines whether all the Allocations will use the Common Power Boost value.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, Power Boost
Mode	LTE
Remote Command	[:SENSe] :EVM:DLINk:PROfile:USER<n>:PDSC:h:PWRBoost:COUPl e OFF ON 0 1 [:SENSe] :EVM:DLINk:PROfile:USER<n>:PDSC:h:PWRBoost:COUPl e?
Example	EVM:DLIN:PROF:USER1:PDSC:PWRB:COUPl ALL
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Add Allocation Adds a new Allocation after the currently selected Allocation and the new entry becomes the selected Allocation. The new Allocation will have the parameters set to the default values.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, Allocation
Mode	LTE
Remote Command	[:SENSe] :EVM:DLINk:PROfile:USER<n>:PDSC:h:ADD:ALLocation
Example	EVM:DLIN:PROF:USER1:PDSC:ADD:ALL

Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. The new Allocation will be added at the end of the currently defined Allocation. The max number of Allocations is 20 and once this has been reached this parameter will be disabled.
Instrument S/W Revision	A.01.60 or later

Delete Allocation Deletes the currently selected Allocation.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, Allocation
Mode	LTE
Remote Command	[:SENSe] :EVM:DLINk:PROFile:USER<n>:PDSCh:ALLocation<m>:DELEte
Example	EVM:DLIN:PROF:USER1:PDSC:ALL1:DEL
Dependencies/Couplings	This parameter will be disabled when there is only one Allocation. The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Allocations the user has configured. . Max value for n=25. Max Value for m=20. If the user attempts to delete a Slot that does not exist an error message will be generated.
Instrument S/W Revision	A.01.60 or later

Allocation RB Start This key allows you to set the Start Resource Block for the selected Allocation.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, RB Start
Mode	LTE
Remote Command	[:SENSe] :EVM:DLINk:PROFile:USER<n>:PDSCh:ALLocation<m>:RB:STARt <integer> [:SENSe] :EVM:DLINk:PROFile:USER<n>:PDSCh:ALLocation<m>RB:STARt?
Example	EVM:DLIN:PROF:USER1:PDSC:ALL1:RB:STAR 0

Dependencies/Couplings	<p>The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Allocations the user has configured. Max value for n=25. Max Value for m=20.</p> <p>If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.</p> <p>If the user attempts to set a RB Start value greater than the RB End value, both values will be set to the RB Start value or clipped to the min or max value if the entered value is out of range</p>
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	99
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Allocation RB End This key allows you to set the Stop Resource Block for the selected Allocation.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, RB End
Mode	LTE
Remote Command	<pre>[:SENSe]:EVM:DLINK:PROFile:USER<n>:PDSCh:ALLocation<m>:RB:END <integer></pre> <pre>[:SENSe]:EVM:DLINK:PROFile:USER<n>:PDSCh:ALLocation<m>:RB:END?</pre>
Example	EVM:DLIN:PROF:USER1:PDSC:ALL1:RB:END 0
Dependencies/Couplings	<p>The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Allocations the user has configured. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.</p> <p>If the user attempts to set a RB End value less than the RB Start value, both values will be set to the RB End value or clipped to the min or max value if the entered value is out of range</p>
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	99
Test MIN/MAX/DEF	No

Instrument S/W Revision A.01.60 or later

Allocation Slot Start This key allows you to set the Start Slot for the selected Allocation.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, Slot Start
Mode	LTE
Remote Command	[:SENSe] :EVM:DLINk:PROFile:USER<n>:PDSCh:ALLocation<m>: SLOT:STARt <integer> [:SENSe] :EVM:DLINk:PROFile:USER<n>:PDSCh:ALLocation<m>: SLOT:STARt?
Example	EVM:DLIN:PROF:USER1:PDSC:ALL1:SLOT:STAR 0
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Allocations the user has configured. Max value for n=25. Max Value for m=20. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message. If the user attempts to set a Slot Start value greater than the Slot End value, both values will be set to the Slot Start value or clipped to the min or max value if the entered value is out of range
Preset	0
State Saved	Saved in instrument state.
Min	1
Max	19
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Allocation Slot End This key allows you to set the End Slot for the selected Allocation.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, Slot End
Mode	LTE
Remote Command	[:SENSe] :EVM:DLINk:PROFile:USER<n>:PDSCh:ALLocation<m>: SLOT:END <integer> [:SENSe] :EVM:DLINk:PROFile:USER<n>:PDSCh:ALLocation<m>: SLOT:END?
Example	EVM:DLIN:PROF:USER1:PDSC:ALL1:SLOT:END 1

Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Allocations the user has configured. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message. If the user attempts to set a Slot End value less than the Slot Start value, both values will be set to the Slot End value or clipped to the min or max value if the entered value is out of range
Preset	0
State Saved	Saved in instrument state.
Min	1
Max	19
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Allocation Mod Type This key allows you to select the Modulation Type for the selected Allocation.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, Mod Type
Mode	LTE
Remote Command	[:SENSE] :EVM:DLINK:PROFile:USER<n>:PDSch:ALLocation<m>:MODulation:TYPE QPSK QAM16 QAM64 [:SENSE] :EVM:DLINK:PROFile:USER<n>:PDSch:ALLocation<m>:MODulation:TYPE?
Example	EVM:DLIN:PROF:USER1:PDSC:ALL1:MOD:TYP QPSK
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Allocations the user has configured. Max value for n=25. Max Value for m=20. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	QPSK
State Saved	Saved in instrument state.
Range	QPSK QAM16 QAM64
Instrument S/W Revision	A.01.60 or later

QPSK Selects QPSK for the Modulation Type of the selected Allocation.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, Mod Type
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Mode LTE
Instrument S/W Revision A.01.60 or later

16QAM Selects 16QAM for the Modulation Type of the selected Allocation.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, Mod Type**
Mode LTE
Instrument S/W Revision A.01.60 or later

64QAM Selects 64QAM for the Modulation Type of the selected Allocation.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, Mod Type**
Mode LTE
Instrument S/W Revision A.01.60 or later

Allocation Power Boost This key allows you to set the Power Boost value for the selected Allocation.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping**
Mode LTE

Remote Command [:SENSe]:EVM:DLINK:PROFile:USER<n>:PDSCh:ALLocation<m>:
PWRBoost <rel_ampl>
[:SENSe]:EVM:DLINK:PROFile:USER<n>:PDSCh:ALLocation<m>:
PWRBoost?

Example EVM:DLIN:PROF:USER1:PDSC:ALL1:PWRB 0

Dependencies/Couplings The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Allocations the user has configured. Max value for n=25. Max Value for m=20.
If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.

Preset 0 dB
State Saved Saved in instrument state.
Min -100 dB
Max 100 dB
Test MIN/MAX/DEF No
Instrument S/W Revision A.01.60 or later

Chan Profile Setup (Uplink)

This key brings up a menu of commonly used chan profile setup parameters when Direction (refer to PD Mode - LTE) is set to Uplink.

Key Path	Meas Setup
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Composite Include

This key brings up a menu which allows the inclusion or exclusion of all channels.

Key Path	Meas Setup, Chan Profile Setup
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Include All This key turns On all Uplink channels.

Key Path	Meas Setup, Chan Profile Setup, Composite Include
Mode	LTE
Remote Command	[:SENSE] :EVM:ULINK:PROFile:INCLude:ALL
Example	EVM:ULIN:PROF:INCL:ALL
Dependencies/Couplings	Turns On the following parameters Include PUSCH Include PUSCH DMRS Include PUCCH Include PUCCH DMRS Include Non Allocation
Instrument S/W Revision	A.01.60 or later

Exclude All This key turns Off all Uplink channels.

Key Path	Meas Setup, Chan Profile Setup, Composite Include
Mode	LTE
Remote Command	[:SENSE] :EVM:ULINK:PROFile:EXCLude:ALL
Example	EVM:ULIN:PROF:EXCLude:ALL

Dependencies/Couplings	Turns Off the following parameters Include PUSCH Include PUSCH DMRS Include PUCCH Include PUCCH DMRS Include Non Allocation
Instrument S/W Revision	A.01.60 or later

Include Users

This key brings up a menu which allows the user to determine which Uplink channels should be included in the results.

Key Path	Meas Setup, Chan Profile Setup, Include Users
Mode	LTE
Dependencies/Couplings	The Users shown on this softpanel are dependant on the number of Users defined. This menu will only display User1 when Uplink Auto Detect is On. When Uplink Auto Detect is off it will display all the defined Users
Instrument S/W Revision	A.01.60 or later

User This key is used to index the currently defined Users.

Key Path	Meas Setup, Chan Profile Setup, Include Users
Mode	LTE
Dependencies/Couplings	This parameter will only be displayed on the Include Users menu when RB Auto Detect is Off. Max value determined by the number of Uplink Users the user has configured
Preset	0
State Saved	Saved in instrument state.
Min	1
Max	Determined by the number of Uplink Users the user has configured
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Include PUSCH This key allows you to determine whether the PUSCH is included in the results.

Key Path	Meas Setup, Chan Profile Setup, Include Users
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Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROFile:USER<n>:PUSCh INCLude EXCLude [:SENSe] :EVM:ULINK:PROFile:USER<n>:PUSCh?
Example	EVM:ULIN:PROF:USER1:PUSC ON
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message. This parameter will only be displayed on the Include Users menu when RB Auto Detect is Off. This parameter will be set to Include when Uplink Include All is selected and set to OFF when Uplink Exclude All is selected. When PUSCH is set to Include, PUCCH and PUCCH DMRS will be set to Exclude.
Preset	INCLude
State Saved	Saved in instrument state.
Range	Include Exclude
Instrument S/W Revision	A.01.60 or later

Include PUSCH DMRS This key allows you to determine whether the PUSCH DMRS is included in the results.

Key Path	Meas Setup, Chan Profile Setup, Include Users
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROFile:USER<n>:PUSCh:DMRS INCLude EXCLude [:SENSe] :EVM:ULINK:PROFile:USER<n>:PUSCh:DMRS?
Example	EVM:ULIN:PROF:USER1:PUSC:DMRS ON
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message. This parameter will only be displayed on the Include Users menu when RB Auto Detect is Off. This parameter will be set to Include when Uplink Include All is selected and set to OFF when Uplink Exclude All is selected. When PUSCH DMRS is set to Include, PUCCH and PUCCH DMRS will be set to Exclude.
Preset	INCLude

State Saved	Saved in instrument state.
Range	Include Exclude
Instrument S/W Revision	A.01.60 or later

Include PUCCH This key allows you to determine whether the PUCCH is included in the results.

Key Path	Meas Setup, Chan Profile Setup, Include Users
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROFile:USER<n>:PUCCh INCLude EXCLude [:SENSe] :EVM:ULINK:PROFile:USER<n>:PUCCh?
Example	EVM:ULIN:PROF:USER1:PUC INCL
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message. This parameter will only be displayed on the Include Users menu when RB Auto Detect is Off. This parameter will be set to Include when Uplink Include All is selected and set to OFF when Uplink Exclude All is selected. When PUCCH is set to Include, PUSCH and PUSCH DMRS will be set to Exclude.
Preset	INCLude
State Saved	Saved in instrument state.
Range	Include Exclude
Instrument S/W Revision	A.01.60 or later

Include PUCCH DMRS This key allows you to determine whether the PUCCH DMRS is included in the results.

Key Path	Meas Setup, Chan Profile Setup, Include Users
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROFile:USER<n>:PUCCh:DMRS INCLude EXCLude [:SENSe] :EVM:ULINK:PROFile:USER<n>:PUCCh:DMRS?
Example	EVM:ULIN:PROF:USER1:PUC:DMRS INCL

Dependencies/Couplings	<p>The range of sub op code <n> values is determined by the number of Users the user has configured. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.</p> <p>This parameter will only be displayed on the Include Users menu when RB Auto Detect is Off.</p> <p>This parameter will be set to Include when Uplink Include All is selected and set to OFF when Uplink Exclude All is selected.</p> <p>When PUCCH DMRS is set to Include, PUSCH and PUSCH DMRS will be set to Exclude.</p>
Preset	INCLude
State Saved	Saved in instrument state.
Range	Include Exclude
Instrument S/W Revision	A.01.60 or later

Include Auto Detect PUSCH This key allows you to determine whether the Auto Detected PUSCH is included in the results.

Key Path	Meas Setup, Chan Profile Setup, Include Users
Mode	LTE
Remote Command	[:SENSe]:EVM:ULINK:PROFile:AUTO:PUSCh INCLude EXCLude [:SENSe]:EVM:ULINK:PROFile:AUTO:PUSCh?
Example	EVM:ULIN:PROF:AUTO:PUSC INCL
Dependencies/Couplings	<p>This parameter will only be displayed on the Include Users menu when RB Auto Detect is On.</p> <p>This parameter will be set to Include when Uplink Include All is selected and set to OFF when Uplink Exclude All is selected.</p> <p>When Auto PUSCH is set to Include, Auto PUCCH and Auto PUCCH DMRS will be set to Exclude.</p> <p>When n RB PUCCH is set to the max number of RB's (dependent on Bandwidth) this parameter will be disabled.</p>
Preset	INCLude
State Saved	Saved in instrument state.
Range	Include Exclude
Instrument S/W Revision	A.01.60 or later

Include Auto Detect PUSCH DMRS This key allows you to determine whether the Auto Detected PUSCH DMRS is included in the results.

Key Path	Meas Setup, Chan Profile Setup, Include Users
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Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROF:Auto:PUSCh:DMRS INCLude EXCLude [:SENSe] :EVM:ULINK:PROF:Auto:PUSCh:DMRS?
Example	EVM:ULIN:PROF:Auto:PUSC:DMRS INCL
Dependencies/Couplings	This parameter will only be displayed on the Include Users menu when RB Auto Detect is On. This parameter will be set to Include when Uplink Include All is selected and set to OFF when Uplink Exclude All is selected. When Auto PUSCH DMRS is set to Include, Auto PUCCH and Auto PUCCH DMRS will be set to Exclude. When n RB PUCCH is set to the max number of RB's (dependent on Bandwidth) this parameter will be disabled.
Preset	INCLude
State Saved	Saved in instrument state.
Range	Include Exclude
Instrument S/W Revision	A.01.60 or later

Include Auto Detect PUCCH This key allows you to determine whether the Auto Detected PUCCH is included in the results.

Key Path	Meas Setup, Chan Profile Setup, Include Users
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROF:Auto:PUCCh INCLude EXCLude [:SENSe] :EVM:ULINK:PROF:Auto:PUCCh?
Example	EVM:ULIN:PROF:Auto:PUCc INCL
Dependencies/Couplings	This parameter will only be displayed on the Include Users menu when RB Auto Detect is On. This parameter will be set to Include when Uplink Include All is selected and set to OFF when Uplink Exclude All is selected. When Auto PUCCH is set to Include, Auto PUSCH and Auto PUSCH DMRS will be set to Exclude. When n RB PUCCH is set to 0 this parameter will be disabled.
Preset	INCLude
State Saved	Saved in instrument state.
Range	Include Exclude
Instrument S/W Revision	A.01.60 or later

Include Auto Detect PUCCH DMRS This key allows you to determine whether the Auto Detected PUCCH DMRS is included in the results.

Key Path	Meas Setup, Chan Profile Setup, Include Users
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROFile:AUTO:PUCCh:DMRS INCLude EXCLude [:SENSe] :EVM:ULINK:PROFile:AUTO:PUCCh:DMRS?
Example	EVM:ULIN:PROF:USER1:PUCCh:DMRS INCL
Dependencies/Couplings	This parameter will only be displayed on the Include Users menu when RB Auto Detect is On. This parameter will be set to Include when Uplink Include All is selected and set to OFF when Uplink Exclude All is selected. When Auto PUCCH DMRS is set to Include, Auto PUSCH and Auto PUSCH DMRS will be set to Exclude. When n RB PUCCH is set to 0 this parameter will be disabled.
Preset	INCLude
State Saved	Saved in instrument state.
Range	Include Exclude
Instrument S/W Revision	A.01.60 or later

Edit User Mapping

The key brings up a Dialog which enables the user to edit the Uplink Channel parameters. Each parameter on the Dialog has a corresponding softpanel which will be displayed when the parameter is selected.

Key Path	Meas Setup, Chan Profile Setup, More, More
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Add User Adds a new User and the new entry becomes the selected User. The new User will have all parameters of its channels set to the default values.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, Users
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROFile:ADD:USER
Example	EVM:ULIN:PROF:ADD:USER

Dependencies/Couplings	The new User will be added at the end of the currently defined Users. The max number of Slots is 25 and once this has been reached this parameter will be disabled.
Instrument S/W Revision	A.01.60 or later

Delete User Deletes the current selected User.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, User
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROFile:USER<n>:DELeTe
Example	EVM:ULIN:PROF:USER1:DEL
Notes	Once a User is deleted, subsequent Users will be renumbered to keep User numbering sequential
Dependencies/Couplings	This parameter will be disabled when there is only one User. The range of sub op code (n) values is determined by the number of Users the user has configured. If the user attempts to remotely delete a sub op code that is out of range this will result in an error message.
Instrument S/W Revision	A.01.60 or later

Uplink Common Parameters This key accesses a menu allowing you to select common parameters for Uplink signals.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, Uplink Common Parameters
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Cell ID This key allows the user to input Cell ID.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, Cell ID
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROFile:USER<n>:CID <integer> [:SENSe] :EVM:ULINK:PROFile:USER<n>:CID?
Example	EVM:ULIN:PROF:USER1:CID 1
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. This parameter will only be displayed when RB Auto Detect is Off.

Preset	1
State Saved	Saved in instrument state.
Min	1
Max	503
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Auto Detect Cell ID This key allows the user to input Auto Detect Cell ID.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, Cell ID
Mode	LTE
Remote Command	[:SENSE]:EVM:ULINK:PROfile:AUTO:CID <integer> [:SENSE]:EVM:ULINK:PROfile:AUTO:CID?
Example	EVM:ULIN:PROF:AUTO:CID 1
Dependencies/Couplings	This parameter will only be displayed when RB Auto Detect is On.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	503
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Auto Detect n RB PUCCH This key allows the user to input Auto Detect n RB PUCCH.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, n RB PUCCH
Mode	LTE
Remote Command	[:SENSE]:EVM:ULINK:PROfile:AUTO:NRB:PUCCh <integer> [:SENSE]:EVM:ULINK:PROfile:AUTO:NRB:PUCCh?
Example	EVM:ULIN:PROF:AUTO:NRB:PUC C 1
Dependencies/Couplings	This parameter will only be displayed when RB Auto Detect is On.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	24

Test MIN/MAX/DEF No
Instrument S/W Revision A.01.60 or later

Group Hopping This key allows you to determine if Group Hopping is used.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, Group Hopping**
Mode LTE
Remote Command [:SENSe]:EVM:ULINk:PROFile:USER<n>:HOPPing:GROup
OFF|ON|0|1
[:SENSe]:EVM:ULINk:PROFile:USER<n>:HOPPing:GROup?
Example EVM:ULIN:PROF:USER1:HOPP:GRO OFF
Dependencies/Couplings The range of sub op code <n> values is determined by the number of
Users the user has configured.
This parameter will only be displayed when RB Auto Detect is Off.
This parameter will be disabled when DMRS Params is Off.
Preset OFF
State Saved Saved in instrument state.
Instrument S/W Revision A.01.60 or later

Auto Detect Group Hopping This key allows you to determine if Auto Detect Group Hopping is used.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, Group Hopping**
Mode LTE
Remote Command [:SENSe]:EVM:ULINk:PROFile:AUTO:HOPPing:GROup
OFF|ON|0|1
[:SENSe]:EVM:ULINk:PROFile:AUTO:HOPPing:GROup?
Example EVM:ULIN:PROF:AUTO:HOPP:GRO OFF
Dependencies/Couplings This parameter will only be displayed when RB Auto Detect is On.
This parameter will be disabled when DMRS Params is Off
Preset OFF
State Saved Saved in instrument state.
Instrument S/W Revision A.01.60 or later

Seq Hopping This key allows you to determine if Seq Hopping is used.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, Seq Hopping**

Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROfile:USER<n>:HOPPing:SEQuence OFF ON 0 1 [:SENSe] :EVM:ULINk:PROfile:USER<n>:HOPPing:SEQuence?
Example	EVM:ULIN:PROF:USER1:HOPP:SEQ OFF
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. This parameter will only be displayed when RB Auto Detect is Off. This parameter will be disabled when DMRS Params is Off
Preset	OFF
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Auto Detect Seq Hopping This key allows you to determine if Auto Detect Seq Hopping is used.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, Seq Hopping
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROfile:AUTO:HOPPing:SEQuence OFF ON 0 1 [:SENSe] :EVM:ULINk:PROfile:AUTO:HOPPing:SEQuence?
Example	EVM:ULIN:PROF:AUTO:HOP:SEQ OFF
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. This parameter will only be displayed when RB Auto Detect is Off. This parameter will be disabled when DMRS Params is Off
Preset	OFF
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Include PUSCH Refer to section Include PUSCH and Include Auto Detect PUSCH

Mode	LTE
Instrument S/W Revision	A.01.60 or later

Include PUCCH Refer to section Include PUCCH and Include Auto Detect PUCCH

Mode	LTE
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Instrument S/W Revision A.01.60 or later

PUSCH Parameters This key accesses a menu allowing you to select PUSCH parameters for signals.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH Parameters**
 Mode LTE
 Instrument S/W Revision A.01.60 or later

Sync Slot This key allows the user to enter the Sync Slot to be used by all PUSCH Slots when Auto Detect is Off.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Sync Slot**
 Mode LTE
Remote Command [:SENSe]:EVM:ULINk:PROFile:USER<n>:PUSCh:SSLot:<integer>
 >
 [:SENSe]:EVM:ULINk:PROFile:USER<n>:PUSCh:SSLot?
 Example EVM:ULIN:PROF:USER1:PUSC:SSLot 1
 Dependencies/Couplings The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25.
 If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
 Preset 0
 State Saved Saved in instrument state.
 Min 0
 Max 19
 Test MIN/MAX/DEF No
 Instrument S/W Revision A.01.60 or later

Auto Detect Sync Slot This key allows the user to enter the Sync Slot to be used by all PUSCH Slots when Auto Detect is On.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Sync Slot**
 Mode LTE
Remote Command [:SENSe]:EVM:ULINk:PROFile:AUTO:PUSCh:SSLot <integer>
 [:SENSe]:EVM:ULINk:PROFile:AUTO:PUSCh:SSLot?
 Example EVM:ULIN:PROF:AUTO:PUSC:SSLot 1
 Preset 0

State Saved	Saved in instrument state.
Min	0
Max	19
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

DMRS Params This key allows you to determine if all DMRS params to be used are common to all Slots or if they are to be defined on a per Slot basis when Auto Detect is Off.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, DMRS Params
Mode	LTE
Remote Command	[:SENSE] :EVM:ULINK:PROFile:USER<n>:PUSCh:DMRS:PARAmS OFF ON 0 1 [:SENSE] :EVM:ULINK:PROFile:USER<n>:PUSCh:DMRS:PARAmS?
Example	EVM:ULIN:PROF:USER1:PUSCh:DMRS:PARAmS OFF
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message. When this parameter is on n DMRS (1), n DMRS (2) and SS will be enabled and DMRS Group (u), DMRS Seq (v) and DMRS Cyclic Shift will be disabled. When this parameter is on n DMRS (1), n DMRS (2) and SS will be disabled and DMRS Group (u), DMRS Seq (v) and DMRS Cyclic Shift will be enabled.
Preset	OFF
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Auto Detect DMRS Params This key allows you to determine if all DMRS params to be used are common to all Slots or if they are to be defined on a per Slot basis when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, DMRS Params
Mode	LTE
Remote Command	[:SENSE] :EVM:ULINK:PROFile:AUTO:PUSCh:DMRS:PARAmS OFF ON 0 1 [:SENSE] :EVM:ULINK:PROFile:AUTO:PUSCh:DMRS:PARAmS?

Example	EVM:ULIN:PROF: AUTO:PUSCh:DMRS:PARams OFF
Dependencies/Couplings	When this parameter is on n DMRS (1), n DMRS (2) and SS will be enabled and DMRS Group (u), DMRS Seq (v) and DMRS Cyclic Shift will be disabled. When this parameter is on n DMRS (1), n DMRS (2) and SS will be disabled and DMRS Group (u), DMRS Seq (v) and DMRS Cyclic Shift will be enabled.
Preset	OFF
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

n DMRS (1) This key allows the user to enter the n DMRS (1) to be used by all PUSCH Slots when Auto Detect is Off.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, n DMRS (1)
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROFile:USER<n>: PUSCh:N:DMRS1 <integer> [:SENSe] :EVM:ULINk:PROFile:USER<n>: PUSCh:N:DMRS1?
Example	EVM:ULIN:PROF:USER1:PUSC:N:DMR1 1
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. This parameter will be disabled when DMRS Params in Off and enabled when DMRS Params is On. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	Sizeof int32
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Auto Detect n DMRS (1) This key allows the user to enter the n DMRS (1) to be used by all PUSCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, n DMRS (1)
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Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROfile:AUTO:PUSCh:N:DMRS1 <integer> [:SENSe] :EVM:ULINk:PROfile:AUTO:PUSCh:N:DMRS1?
Example	EVM:ULIN:PROF:AUTO:PUSC:N:DMR1 1
Dependencies/Couplings	This parameter will be disabled when DMRS Params in Off and enabled when DMRS Params is On. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	Sizeof int32
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

n DMRS (2) This key allows the user to enter the n DMRS (2) to be used by all PUSCH Slots when Auto Detect is Off.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, n DMRS (2)
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROfile:USER<n>:PUSCh:N:DMRS2 <integer> [:SENSe] :EVM:ULINk:PROfile:USER<n>:PUSCh:N:DMRS2?
Example	EVM:ULIN:PROF:USER1:PUSC:N:DMR2 1
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. This parameter will be disabled when DMRS Params in Off and enabled when DMRS Params is On. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	Sizeof int32
Test MIN/MAX/DEF	No

Instrument S/W Revision A.01.60 or later

Auto Detect n DMRS (2) This key allows the user to enter the n DMRS (2) to be used by all PUSCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, n DMRS (2)
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROFile:AUTO:PUSCh:N:DMRS2 <integer> [:SENSe] :EVM:ULINk:PROFile:AUTO:PUSCh:N:DMRS2?
Example	EVM:ULIN:PROF:AUTO:PUSC:N:DMR2 1
Dependencies/Couplings	This parameter will be disabled when DMRS Params in Off and enabled when DMRS Params is On. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	Sizeof int32
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

SS (Delta SS) This key allows the user to enter the Sync Slot to be used by all PUSCH Slots when Auto Detect is Off.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, SS
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:DSS:<integer> [:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:DSS?
Example	EVM:ULIN:PROF:USER1:PUSC:DSS 1
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. This parameter will be disabled when DMRS Params in Off and enabled when DMRS Params is On. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	0

State Saved	Saved in instrument state.
Min	0
Max	29
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Auto Detect SS (Delta SS) This key allows the user to enter the Sync Slot to be used by all PUSCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, SS
Mode	LTE
Remote Command	[:SENSE] :EVM:ULINK:PROFile:AUTO:PUSCh:DSS <integer> [:SENSE] :EVM:ULINK:PROFile:AUTO:PUSCh:DSS?
Example	EVM:ULIN:PROF:AUTO:PUSC:DSS 1
Dependencies/Couplings	This parameter will be disabled when DMRS Params in Off and enabled when DMRS Params is On. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	29
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Common RB Start This key allows you to set the Start Resource Block to be used by all the PUSCH Slots when RB Start Couple is On and when Auto Detect is Off.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, RB Start
Mode	LTE
Remote Command	[:SENSE] :EVM:ULINK:PROFile:USER<n>:PUSCh:RB:START <integer> [:SENSE] :EVM:ULINK:PROFile:USER<n>:PUSCh:RB:START?
Example	EVM:ULIN:PROF:USER1:PUSC:RB:STAR 0

Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message. If the user attempts to set a RB Start value greater than the RB Stop value, both values will be set to the RB Start value or clipped to the min or max value if the entered value is out of range
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	99
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

RB Start Couple This key determines whether all the PUSCH Slots will use the Common RB Start value.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Couple Power Boost
Mode	LTE
Remote Command	[:SENSE] :EVM:ULINK:PROFile:USER<n>:PUSCh:RB:STARt:COUPl e OFF ON 0 1 [:SENSe] :EVM:ULINK:PROFile:USER<n>:PUSCh:RB:STARt:COUPl e?
Example	EVM:ULIN:PROF:USER1:PUSC:RB:STAR:COUP ON
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Auto Detect RB Start This key allows you to set the Start Resource Block to be used by all the PUSCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, RB Start
Mode	LTE

Remote Command	[:SENSE]:EVM:ULINK:PROFile:AUTO:PUSCh:RB:STARt <integer> [:SENSE]:EVM:ULINK:PROFile:AUTO:PUSCh:RB:STARt?
Example	EVM:ULIN:PROF:AUTO:PUSC:RB:STAR 0
Dependencies/Couplings	If the user attempts to set a RB Start value greater than the RB Stop value, both values will be set to the RB Start value or clipped to the min or max value if the entered value is out of range
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	99
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Common RB End This key allows you to set the End Resource Block to be used by all the PUSCH Slots when RB End Couple is On and when Auto Detect is Off.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, RB End**

Mode LTE

Remote Command [:SENSE]:EVM:ULINK:PROFile:USER<n>:PUSCh:RB:END
<integer>

[:SENSE]:EVM:ULINK:PROFile:USER<n>:PUSCh:RB:END?

Example EVM:ULIN:PROF:USER1:PUSC:RB:END 0

Dependencies/Couplings The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25.

If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.

If the user attempts to set a RB End value less than the RB Start value, both values will be set to the RB End value or clipped to the min or max value if the entered value is out of range

Preset	0
State Saved	Saved in instrument state.
Min	0
Max	99
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

RB End Couple This key determines whether all the PUSCH Slots will use the Common RB Start

value.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,Couple Power Boost
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROFile:USER<n>:PUSCh:RB:END:COUPle OFF ON 0 1 [:SENSe] :EVM:ULINK:PROFile:USER<n>:PUSCh:RB:END:COUPle?
Example	EVM:ULIN:PROF:USER1:PUSC:RB:END:COUP ON
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	ALL
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Auto Detect RB End This key allows you to set the End Resource Block to be used by all the PUSCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,RB End
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROFile:AUTO:PUSCh:RB:END <integer> [:SENSe] :EVM:ULINK:PROFile:AUTO:PUSCh:RB:END?
Example	EVM:ULIN:PROF:AUTO:PUSC:RB:END 0
Dependencies/Couplings	If the user attempts to set a RB End value less than the RB Start value, both values will be set to the RB End value or clipped to the min or max value if the entered value is out of range
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	99
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Common Mod Type This key allows you to select the Modulation Type to be used by all the

PUSCH Slots when Mod Type Couple is On and when Auto Detect is Off.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Mod Type
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROfile:USER<n>:PUSCh:MODulation:TYPE QPSK QAM16 QAM64 [:SENSe] :EVM:ULINk:PROfile:USER<n>:PUSCh:MODulation:TYPE?
Example	EVM:ULIN:PROF:USER1:PUSC:MOD:TYP QPSK
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	QPSK
State Saved	Saved in instrument state.
Range	QPSK QAM16 QAM64
Instrument S/W Revision	A.01.60 or later

QPSK Selects QPSK for the Modulation Type to be used by all the PUSCH Slots when Mod Type Couple is All.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Mod Type
Mode	LTE
Instrument S/W Revision	A.01.60 or later

16QAM Selects 16QAM for the Modulation Type to be used by all the PUSCH Slots when Mod Type Couple is All.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,Couple Mod Type
Mode	LTE
Instrument S/W Revision	A.01.60 or later

64QAM Selects 64QAM for the Modulation Type to be used by all the PUSCH Slots when Mod Type Couple is All.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,Couple Mod Type
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Mod Type Couple This key determines whether all the PUSCH Slots will use the Common Mod Type value.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Couple Mod Type
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:MODulation:TYPE:COUPle OFF ON 0 1 [:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:MODulation:TYPE:COUPle?
Example	EVM:ULIN:PROF:USER1:PUSC:MOD:TYP:COUP ON
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	On
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Auto Detect Mod Type This key allows you to select the Modulation Type to be used by all the PUSCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Mod Type
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:MODulation:TYPE QPSK QAM16 QAM64 [:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:MODulation:TYPE?
Example	EVM:ULIN:PROF:USER1:PUSC:MOD:TYP QPSK
Preset	QPSK
State Saved	Saved in instrument state.
Range	QPSK QAM16 QAM64
Instrument S/W Revision	A.01.60 or later

QPSK Selects QPSK for the Modulation Type to be used by all the PUSCH Slots when Auto Detect in On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Mod Type
Mode	LTE

Instrument S/W Revision A.01.60 or later

16QAM Selects 16QAM for the Modulation Type to be used by all the PUSCH Slots when Auto Detect is On.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,Couple Mod Type**

Mode LTE

Instrument S/W Revision A.01.60 or later

64QAM Selects 64QAM for the Modulation Type to be used by all the PUSCH Slots when Auto Detect is On.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,Couple Mod Type**

Mode LTE

Instrument S/W Revision A.01.60 or later

Common Power Boost This key allows you to select the Power Boost value to be used by all the PUSCH Slots when Power Boost Couple is On and when Auto Detect is Off.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,Couple Power**

Mode LTE

Remote Command [:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:PWRBoost <rel_ampl>

 [:SENSe]:EVM:ULINK:PROFile:USER<n>:PUSCh:PWRBoost?

Example EVM:ULIN:PROF:USER1:PUSC:PWRB 0

Dependencies/Couplings The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25.

 If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.

Preset 0 dB

State Saved Saved in instrument state.

Min -100 dB

Max 100 dB

Test MIN/MAX/DEF No

Instrument S/W Revision A.01.60 or later

Power Boost Couple This key determines whether all the PUSCH Slots will use the Common

Power Boost value.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,Couple Power
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:PWRBoost:COUPl e OFF ON 0 1 [:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:PWRBoost:COUPl e
Example	EVM:ULIN:PROF:USER1:PUSC:PWRB:COUP ON
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Auto Detect Power Boost This key allows you to select the Power Boost value to be used by all the PUSCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,Couple Power
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROFile:AUTO:PUSCh:PWRBoost <rel_amp1> [:SENSe] :EVM:ULINk:PROFile:AUTO:PUSCh:PWRBoost?
Example	EVM:ULIN:PROF:AUTO:PUSC:PWRB 0
Preset	0 dB
State Saved	Saved in instrument state.
Min	-100 dB
Max	100 dB
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Common DMRS Group This key allows the user to enter the DMRS Group to be used by all the PUSCH Slots when DMRS Group Couple is On and when Auto Detect is Off.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,DMRS Group
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Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROFile:USER<n> :PUSCh:DMRS:GROup <integer> [:SENSe] :EVM:ULINk:PROFile:USER<n> :PUSCh:DMRS:GROup?
Example	EVM:ULIN:PROF:USER1:PUSC:DMRS:GRO 1
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. When DMRS Params is On, this parameter will be disabled. When DMRS Params is Off, this parameter will be enabled. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	29
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

DMRS Group Couple This key determines whether all the PUSCH Slots will use the Common DMRS Group value.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,DMRS Group
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROFile:USER<n> :PUSCh:DMRS:GROup:COU Ple OFF ON 0 1 [:SENSe] :EVM:ULINk:PROFile:USER<n> :PUSCh:DMRS:GROup:COU Ple?
Example	EVM:ULIN:PROF:USER1:PUSC:DMRS:GRO:COUP ON
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. When DMRS Params is On, this parameter will be disabled. When DMRS Params is Off, this parameter will be enabled. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Auto Detect DMRS Group This key allows the user to enter the DMRS Group to be used by all the PUSCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,DMRS Group
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROFile:AUTO:PUSCh:DMRS:GROup <integer> [:SENSe] :EVM:ULINk:PROFile:AUTO:PUSCh:DMRS:GROup?
Example	EVM:ULIN:PROF:AUTO:PUSC:DMRS:GRO 1
Dependencies/Couplings	When DMRS Params is On, this parameter will be disabled. When DMRS Params is Off, this parameter will be enabled.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	29
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Common DMRS Sequence This key allows the user to enter the DMRS Sequence (v) to be used by all the PUSCH Slots when DMRS Sequence Couple is On and when Auto Detect is Off. DMRS Sequence or v, is the sequence number within the group and can take on values from 0 to floor(NZCRS/30)-1, where NZCRS is the largest prime number less than MSCRS

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,DMRS Seq
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:DMRS:SEQuence <integer> [:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:DMRS:SEQuence?
Example	EVM:ULIN:PROF:USER1:PUSC:DMRS:SEQ 1
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. When DMRS Params is On, this parameter will be disabled. When DMRS Params is Off, this parameter will be enabled. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	0
State Saved	Saved in instrument state.
Min	0

Max	$\text{floor}(\text{NZCRS}/30)-1$ (can be restricted based on bandwidth)
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

DMRS Sequence Couple This key determines whether all the PUSCH Slots will use the Common DMRS Sequence value.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,DMRS Seq
Mode	LTE
Remote Command	[:SENSe]:EVM:ULINk:PROfile:USER<n>:PUSCh:DMRS:SEquence: COUPle OFF ON 0 1 [:SENSe]:EVM:ULINk:PROfile:USER<n>:PUSCh:DMRS:SEquence: COUPle?
Example	EVM:ULIN:PROF:USER1:PUSC:DMRS:SEQ:COUP ON
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. When DMRS Params is On, this parameter will be disabled. When DMRS Params is Off, this parameter will be enabled. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Auto Detect DMRS Sequence This key allows the user to enter the DMRS Sequence (v) to be used by all the PUSCH Slots when Auto Detect is On. DMRS Sequence or v, is the sequence number within the group and can take on values from 0 to $\text{floor}(\text{NZCRS}/30)-1$, where NZCRS is the largest prime number less than MSCRS

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,DMRS Seq
Mode	LTE
Remote Command	[:SENSe]:EVM:ULINk:PROfile:AUTO:PUSCh:DMRS:SEquence <integer> [:SENSe]:EVM:ULINk:PROfile:AUTO:PUSCh:DMRS:SEquence?
Example	EVM:ULIN:PROF:AUTO:PUSC:DMRS:SEQ 1
Dependencies/Couplings	When DMRS Params is On, this parameter will be disabled. When DMRS Params is Off, this parameter will be enabled.
Preset	0
State Saved	Saved in instrument state.

Min	0
Max	floor(NZCRS/30)-1 (can be restricted based on bandwidth)
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Common DMRS Cyclic Shift This key allows the user to enter the DMRS Cyclic Shift to be used by all the PUSCH Slots when DMRS Cyclic Shift Couple is On and when Auto Detect is Off.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,DMRS Cyclic Shift Couple
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:DMRS:CSHift <integer> [:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:DMRS:CSHift?
Example	EVM:ULIN:PROF:USER1:PUSC:DMRS:CSH 1
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. When DMRS Params is On, this parameter will be disabled. When DMRS Params is Off, this parameter will be enabled. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	11
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

DMRS Cyclic Shift Couple This key determines whether all the PUSCH Slots will use the Common DMRS Cyclic Shift value.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,DMRS Cyclic Shift Couple
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:DMRS:CSHift:CO UPle OFF ON 0 1 [:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:DMRS:CSHift:CO UPle?

Example	EVM:ULIN:PROF:USER1:PUSC:DMRS:CSH:COUP ON
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. When DMRS Params is On, this parameter will be disabled. When DMRS Params is Off, this parameter will be enabled. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Auto Detect DMRS Cyclic Shift This key allows the user to enter the DMRS Cyclic Shift to be used by all the PUSCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,DMRS Cyclic Shift Couple
Mode	LTE
Remote Command	[:SENSE] :EVM:ULINK:PROFile:AUTO:PUSCh:DMRS:CSHift <integer> [:SENSE] :EVM:ULINK:PROFile:AUTO:PUSCh:DMRS:CSHift?
Example	EVM:ULIN:PROF:AUTO:PUSC:DMRS:CSH 1
Dependencies/Couplings	When DMRS Params is On, this parameter will be disabled. When DMRS Params is Off, this parameter will be enabled.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	11
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Common DMRS Power Boost This key allows you to select the DMRS Power Boost value to be used by all the PUSCH Slots when DMRS Power Boost Couple is On and when Auto Detect is Off.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,Couple DMRS Power
Mode	LTE

Remote Command	<code>[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:DMRS:PWRBoost<rel_amp1></code> <code>[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:DMRS:PWRBoost?</code>
Example	<code>EVM:ULIN:PROF:USER1:PUSC:DMRS:PWRB 0</code>
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	0 dB
State Saved	Saved in instrument state.
Min	-100 dB
Max	100 dB
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

DMRS Power Boost Couple This key determines whether all the PUSCH Slots will use the Common DMRS Power Boost value.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,Couple DMRS Power
Mode	LTE
Remote Command	<code>[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:DMRS:PWRBoost:COUPle OFF ON 0 1</code> <code>[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:DMRS:PWRBoost:COUPle</code>
Example	<code>EVM:ULIN:PROF:USER1:PUSC:DMRS:PWRB:COUP ON</code>
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Auto Detect DMRS Power Boost This key allows you to select the DMRS Power Boost value to be used by all the PUSCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,Couple DMRS Power
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Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROfile:AUTO:PUSCh:DMRS:PWRBoost <rel_ampl> [:SENSe] :EVM:ULINk:PROfile:AUTO:PUSCh:DMRS:PWRBoost?
Example	EVM:ULIN:PROF:AUTO:PUSC:DMRS:PWRB 0
Preset	0 dB
State Saved	Saved in instrument state.
Min	-100 dB
Max	100 dB
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Add Slot Adds a new Slot in the position specified, if available. The new Slot will have its parameters set to the default values.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Slot
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROfile:USER<n>:PUSCh:ADD:SLOT<integer>
Example	EVM:ULIN:PROF:USER1:PUSC:ADD:SLOT 0
Notes	The softkey for this parameter is an Immediate Action key. The value that is passed in by the SCPI command allows the user to position the slot. To use sub op codes for this purpose would be confusing to the user.
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. The max number of Slots is 20 and once this has been reached this parameter will be disabled. If the user attempts to add a Slot to a User and the slot is already allocated an error message will be generated.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	99
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Delete Slot Deletes the currently selected Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Slot
Mode	LTE
Remote Command	[:SENSE] :EVM:ULINK:PROFfile:USER<n>:PUSCh:SLOT<m>:DELete
Example	EVM:ULIN:PROF:USER1:PUSC:SLOT1:DEL
Dependencies/Couplings	This parameter will be disabled when there is only one Slot. The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Slots the user has configured. . Max value for n=25. Max Value for m=20. The range of sub op code <m> values is 0 – 19. If the user attempts to delete a Slot that does not exist an error message will be generated.
Instrument S/W Revision	A.01.60 or later

Move Down Moves the currently selected Slot down .

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Slot
Mode	LTE
Dependencies/Couplings	This parameter will be disabled when there are no Slots defined or if the slot is at Slot0.
Instrument S/W Revision	A.01.60 or later

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Slot
Mode	LTE
Remote Command	[:SENSE] :EVM:ULINK:PROFfile:USER<n>:PUSCh:ADD:SLOT<integer>
Example	EVM:ULIN:PROF:USER1:PUSC:ADD:SLOT 0
Notes	The softkey for this parameter is an Immediate Action key. The value that is passed in by the SCPI command allows the user to position the slot. To use sub op codes for this purpose would be confusing to the user.
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. The max number of Slots is 20 and once this has been reached this parameter will be disabled. If the user attempts to add a Slot to a User and the slot is already allocated an error message will be generated.
Preset	0

State Saved	Saved in instrument state.
Min	0
Max	99
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Move Up Moves the currently selected Slot up .

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Slot
Mode	LTE
Dependencies/Couplings	This parameter will be disabled when there are no Slots defined or if the slot is at Slot19.
Instrument S/W Revision	A.01.60 or later

Slot Position Sets the slot start position.

Key Path	SCPI Only
Mode	LTE
Remote Command	[:SENSE] :EVM:ULINK:PROfile:USER<n>:PUSCh:SLOT<m>:POSiti on <integer> [:SENSe] :EVM:ULINK:PROfile:USER<n>:PUSCh:SLOT<m>:POSiti on?
Example	EVM:ULIN:PROF:USER1:PUSC:SLOT1:POS 5
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Slots the user has configured. . Max value for n=25. Max Value for m=20. The range of sub op code <m> values is 0 – 19. If the user attempts to assign a slot position that is already allocated an error message will be generated.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	19
Instrument S/W Revision	A.01.60 or later

Slot RB Start This key allows you to set the Start Resource Block for the selected PUSCH Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, RB Start
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Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>:RB:STARt <integer> [:SENSe] :EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>:RB:STARt?
Example	EVM:ULIN:PROF:USER1:PUSC:SLOT1:RB:STAR 0
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Slots the user has configured. . Max value for n=25. Max Value for m=20. The range of sub op code <m> values is 0 – 19. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message. If the user attempts to set a RB Start value greater than the RB End value, both values will be set to the RB Start value or clipped to the min or max value if the entered value is out of range. Max value dependent on Bandwidth.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	99
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Slot RB End This key allows you to set the Stop Resource Block for the selected PUSCH Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, RB End
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>:RB:END <integer> [:SENSe] :EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>:RB:END ?
Example	EVM:ULIN:PROF:USER1:PUSC:SLOT1:RB:END 0

Dependencies/Couplings	<p>The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Slots the user has configured. . Max value for n=25. Max Value for m=20. The range of sub op code <m> values is 0 – 19.</p> <p>If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.</p> <p>If the user attempts to set a RB End value less than the RB Start value, both values will be set to the RB End value or clipped to the min or max value if the entered value is out of range.</p> <p>Max value dependent on Bandwidth.</p>
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	99
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Slot Mod Type This key allows you to select the Modulation Type for the selected PUSCH Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Mod Type
Mode	LTE
Remote Command	<pre>[:SENSe]:EVM:ULINk:PROfile:USER<n>:PUSCh:SLOT<m>:MODulation:TYPE QPSK QAM16 QAM64</pre> <pre>[:SENSe]:EVM:ULINk:PROfile:USER<n>:PUSCh:SLOT<m>:MODulation:TYPE?</pre>
Example	EVM:ULIN:PROF:USER1:PUSC:SLOT1:MOD:TYP QPSK
Dependencies/Couplings	<p>The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Slots the user has configured. . Max value for n=25. Max Value for m=20. The range of sub op code <m> values is 0 – 19.</p> <p>If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.</p>
Preset	QPSK
State Saved	Saved in instrument state.
Range	QPSK QAM16 QAM64
Instrument S/W Revision	A.01.60 or later

QPSK Selects QPSK for the Modulation Type of the selected PUSCH Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Mod Type
Mode	LTE
Instrument S/W Revision	A.01.60 or later

16QAM Selects 16QAM for the Modulation Type of the selected PUSCH Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Mod Type
Mode	LTE
Instrument S/W Revision	A.01.60 or later

64QAM Selects 64QAM for the Modulation Type of the selected PUSCH Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Mod Type
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Slot Power Boost This key allows you to set the Power Boost value for the selected PUSCH Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Power Boost
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Mode	LTE
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Remote Command	<code>[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:SLOT<m>:PWRBoost <rel_amp1></code> <code>[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:SLOT<m>:PWRBoost?</code>
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Example	<code>EVM:ULIN:PROF:USER1:PUSC:SLOT1:PWRB 0</code>
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Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Slots the user has configured. . Max value for n=25. Max Value for m=20. The range of sub op code <m> values is 0 – 19.
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If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.

Preset	0 dB
State Saved	Saved in instrument state.
Min	-100 dB
Max	100 dB

Test MIN/MAX/DEF No
Instrument S/W Revision A.01.60 or later

Slot DMRS Group This key allows the user to enter the DMRS Group to be used by the selected PUSCH Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,DMRS Group
Mode	LTE
Remote Command	[:SENSE] :EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>:DMRS:GROup <integer> [:SENSe] :EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>:DMRS:GROup?
Example	EVM:ULIN:PROF:USER1:PUSC:SLOT1:DMRS:GRO 1
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Slots the user has configured. . Max value for n=25. Max Value for m=20. The range of sub op code <m> values is 0 – 19. When DMRS Params is On, this parameter will be disabled. When DMRS Params is Off, this parameter will be enabled. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	29
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Slot DMRS Sequence This key allows the user to enter the DMRS Sequence (v) to be used by the selected PUSCH. DMRS Sequence or v, is the sequence number within the group and can take on values from 0 to floor(NZCRS/30)–1, where NZCRS is the largest prime number less than MSCRS

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,DMRS Seq
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>:DMRS:SEQuence <integer> [:SENSe] :EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>:DMRS:SEQuence?
Example	EVM:ULIN:PROF:USER1:PUSC:DMRS:SEQ 1

Dependencies/Couplings	<p>The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Slots the user has configured. . Max value for n=25. Max Value for m=20. The range of sub op code <m> values is 0 – 19.</p> <p>When DMRS Params is On, this parameter will be disabled. When DMRS Params is Off, this parameter will be enabled.</p> <p>If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.</p>
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	floor(NZCRS/30)-1 (can be restricted based on bandwidth)
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Slot DMRS Cyclic Shift This key allows the user to enter the DMRS Cyclic Shift to be used by the selected PUSCH Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,DMRS Cyclic Shift
Mode	LTE
Remote Command	<pre>[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:SLOT<m>:DMRS:CShift <integer></pre> <pre>[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUSCh:SLOT<m>:DMRS:CShift?</pre>
Example	EVM:ULIN:PROF:USER1:PUSC:SLOT1:DMRS:CSH 1
Dependencies/Couplings	<p>The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Slots the user has configured. . Max value for n=25. Max Value for m=20. The range of sub op code <m> values is 0 – 19.</p> <p>When DMRS Params is On, this parameter will be disabled. When DMRS Params is Off, this parameter will be enabled.</p> <p>If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.</p>
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	11

Test MIN/MAX/DEF No
 Instrument S/W Revision A.01.60 or later

Slot DMRS Power Boost This key allows you to set the DMRS Power Boost value for the selected PUSCH Slot.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, DMRS Power Boost**

Mode LTE

Remote Command [:SENSE]:EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>:DMRS:PWRBoost <rel_ampl>
 [:SENSE]:EVM:ULINK:PROFile:USER<n>:PUSCh:SLOT<m>:DMRS:PWRBoost?

Example EVM:ULIN:PROF:USER1:PUSC:SLOT1:DMRS:PWRB 0

Dependencies/Couplings The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Slots the user has configured. . Max value for n=25. Max Value for m=20. The range of sub op code <m> values is 0 – 19.

If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.

Preset 0 dB

State Saved Saved in instrument state.

Min –100 dB

Max 100 dB

Test MIN/MAX/DEF No

Instrument S/W Revision A.01.60 or later

PUCCH Parameters This key accesses a menu allowing you to select PUCCH parameters for signals.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH Parameters**

Mode LTE

Instrument S/W Revision A.01.60 or later

Common Sync Slot This key allows the user to enter the Sync Slot for all PUCCH Slots when Auto Detect is Off.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Sync Slot**

Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROFile:USER<n>:PUCCh:SSLot <integer> [:SENSe] :EVM:ULINK:PROFile:USER<n>:PUCCh:SSLot?
Example	EVM:ULIN:PROF:USER1:PUCCh:SSL 1
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	19
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Auto Detect Sync Slot This key allows the user to enter the Sync Slot for all PUCCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Sync Slot
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROFile:AUTO:PUCCh:SSLot <integer> [:SENSe] :EVM:ULINK:PROFile:AUTO:PUCCh:SSLot?
Example	EVM:ULIN:PROF:AUTO:PUCCh:SSL 1
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	19
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Common First RB This key allows you to set the First Resource Block to be used by all the PUCCH Slots when First RB Couple is On and when Auto Detect is Off.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, First RB
Mode	LTE

Remote Command	<code>[:SENSe]:EVM:ULINk:PROFile:USER<n>:PUCCh:RB <integer></code> <code>[:SENSe]:EVM:ULINk:PROFile:USER<n>:PUCCh:RB?</code>
Example	EVM:ULIN:PROF:USER1:PUC:RB 0
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message. Max value dependent on Bandwidth.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	99
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

First RB Couple This key determines whether all the PUCCH Slots will use the Common First RB value.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH,Couple First RB
Mode	LTE
Remote Command	<code>[:SENSe]:EVM:ULINk:PROFile:USER<n>:PUCCh:RB:COUPle</code> <code>OFF ON 0 1</code> <code>[:SENSe]:EVM:ULINk:PROFile:USER<n>:PUCCh:RB:COUPle?</code>
Example	EVM:ULIN:PROF:USER1:PUC:RB:COUP ON
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Auto Detect First RB This key allows you to set the First Resource Block to be used by all the PUCCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, First RB
Mode	LTE

Remote Command	<code>[:SENSe] :EVM:ULINk:PROFile:AUTO:PUCCh:RB <integer></code> <code>[:SENSe] :EVM:ULINk:PROFile:AUTO:PUCCh:RB?</code>
Example	<code>EVM:ULIN:PROF:AUTO:PUCCh:RB 0</code>
Dependencies/Couplings	Max value dependent on Bandwidth.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	99
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Common Format This key allows you to select the PUCCH Format type to be used by all the PUCCH Slots when Format Couple is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Format
Mode	LTE

Remote Command	<code>[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUCCh:FORMat</code> <code>T1 T1A T1B T2 T2A T2B</code> <code>[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUCCh:FORMat?</code>
Example	<code>EVM:ULIN:PROF:USER1:PUCCh:FORMAT T1</code>
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	T1
State Saved	Saved in instrument state.
Range	Type 1 Type 1a Type 1b Type 2 Type 2a Type 2b
Instrument S/W Revision	A.01.60 or later

Type 1 Selects 1 for the Format type to be used by all the PUCCH Slots when Format Couple is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Format
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Type 1a Selects 1a for the Format type to be used by all the PUCCH Slots when Format Couple is

On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Format
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Type 1b Selects 1b for the Format type to be used by all the PUCCH Slots when Format Couple is On and when Auto Detect is Off.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Format
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Type 2 Selects 2 for the Format type to be used by all the PUCCH Slots when Format Couple is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Format
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Type 2a Selects 2a for the Format type to be used by all the PUCCH Slots when Format Couple is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Format
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Type 2b Selects 2b for the Format type to be used by all the PUCCH Slots when Format Couple is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Format
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Format Couple This key determines whether all the PUSCH Slots will use the Common Format value.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Format
Mode	LTE

Remote Command [:SENSE] :EVM:ULINK:PROFile:USER<n>:PUCCh:FORMat:COUPlE
 OFF | ON | 0 | 1
 [:SENSE] :EVM:ULINK:PROFile:USER<n>:PUCCh:FORMat:COUPlE?

Example	EVM:ULIN:PROF:USER1:PUC:FORM:COUP ON
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

AutoDetect Format This key allows you to select the PUCCH Format type to be used by all the PUCCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Format
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROFile:AUTO:PUCCh:FORMat T1 T1A T1B T2 T2A T2B [:SENSe] :EVM:ULINK:PROFile:AUTO:PUCCh:FORMat?
Example	EVM:ULIN:PROF:AUTO:PUC:FORMAT T1
Preset	T1
State Saved	Saved in instrument state.
Range	Type 1 Type 1a Type 1b Type 2 Type 2a Type 2b
Instrument S/W Revision	A.01.60 or later

Type 1 Selects 1 for the Format type to be used by all the PUCCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Format
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Type 1a Selects 1a for the Format type to be used by all the PUCCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Format
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Type 1b Selects 1b for the Format type to be used by all the PUCCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Format
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Mode LTE
Instrument S/W Revision A.01.60 or later

Type 2 Selects 2 for the Format type to be used by all the PUCCH Slots when Auto Detect is On.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Format**
Mode LTE
Instrument S/W Revision A.01.60 or later

Type 2a Selects 2a for the Format type to be used by all the PUCCH Slots when Auto Detect is On.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Format**
Mode LTE
Instrument S/W Revision A.01.60 or later

Type 2b Selects 2b for the Format type to be used by all the PUCCH Slots when Auto Detect is On.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Format**
Mode LTE
Instrument S/W Revision A.01.60 or later

Common Cyclic Shift This key allows the user to enter the Cyclic Shift to be used by all the PUCCH Slots when Cyclic Shift Couple is On and Auto Detect is Off.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Cyclic Shift**
Mode LTE

Remote Command [:SENSe]:EVM:ULINk:PROFile:USER<n>:PUCCh:CSHift <integer>

[:SENSe]:EVM:ULINk:PROFile:USER<n>:PUCCh:CSHift?

Example EVM:ULIN:PROF:USER1:PUCCh:CSH 1

Dependencies/Couplings The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25.

If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.

Preset 0

State Saved Saved in instrument state.

Min 1

Max 11

Test MIN/MAX/DEF No
 Instrument S/W Revision A.01.60 or later

Cyclic Shift Couple This key determines whether all the PUCCH Slots will use the Common Cyclic Shift value.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Cyclic Shift**
 Mode LTE
Remote Command [:SENSe]:EVM:ULINK:PROFile:USER<n>:PUCCh:CSHift:COUPle
 OFF|ON|0|1
 [:SENSe]:EVM:ULINK:PROFile:USER<n>:PUCCh:CSHift:COUPle?
 Example EVM:ULIN:PROF:USER1:PUCc:ALPH:COUP ON
 Dependencies/Couplings The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25.
 If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
 Preset ON
 State Saved Saved in instrument state.
 Instrument S/W Revision A.01.60 or later

Auto Detect Cyclic Shift This key allows the user to enter the Cyclic Shift to be used by all the PUCCH Slots when Auto Detect is On.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Cyclic Shift**
 Mode LTE
Remote Command [:SENSe]:EVM:ULINK:PROFile:AUTO:PUCCh:CSHift <integer>
 [:SENSe]:EVM:ULINK:PROFile:AUTO:PUCCh:CSHift?
 Example EVM:ULIN:PROF:AUTO:PUCc:CSH 1
 Preset 0
 State Saved Saved in instrument state.
 Min 1
 Max 11
 Test MIN/MAX/DEF No
 Instrument S/W Revision A.01.60 or later

Common OS This key allows the user to enter the OS to be used by all the PUCCH Slots when OS

Couple is On and Auto Detect is Off.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, OS
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROFile:USER<n>:PUCCh:OS INDeX0 INDeX1 INDeX2 [:SENSe] :EVM:ULINK:PROFile:USER<n>:PUCCh:OS?
Example	EVM:ULIN:PROF:USER1:PUCCh:OS INDO
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	IND0
State Saved	Saved in instrument state.
Range	Index 0 Index1 Index2
Instrument S/W Revision	A.01.60 or later

Index0 Selects Index0 for the OS to be used by all the PUCCH Slots when OS Couple is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, OS
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Index1 Selects Index1 for the OS to be used by all the PUCCH Slots when OS Couple is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, OS
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Index2 Selects Index2 for the OS to be used by all the PUCCH Slots when OS Couple is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, OS
Mode	LTE
Instrument S/W Revision	A.01.60 or later

OS Couple This key determines whether all the PUCCH Slots will use the Common OS value.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH,OS
Mode	LTE

Remote Command	[:SENSe] :EVM:ULINK:PROFile:USER<n>:PUCCh:OS:COUPle OFF ON 0 1 [:SENSe] :EVM:ULINK:PROFile:USER<n>:PUCCh:OS:COUPle?
Example	EVM:ULIN:PROF:USER1:PUCc:OS:COUP ON
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Auto Detect OS This key allows the user to enter the OS to be used by all the PUCCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, OS
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROFile:AUTO:PUCCh:OS INDEX0 INDEX1 INDEX2 [:SENSe] :EVM:ULINK:PROFile:AUTO:PUCCh:OS?
Example	EVM:ULIN:PROF:AUTO:PUCc:OS INDO
Preset	IND0
State Saved	Saved in instrument state.
Range	Index 0 Index1 Index2
Instrument S/W Revision	A.01.60 or later

Index0 Selects Index0 for the OS to be used by all the PUCCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, OS
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Index1 Selects Index1 for the OS to be used by all the PUCCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, OS
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Index2 Selects Index2 for the OS to be used by all the PUCCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, OS
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Common Power Boost This key allows you to select the Power Boost value to be used by all the PUCCH Slots when Power Boost Couple is On and Auto Detect is Off.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Couple Power Boost
Mode	LTE
Remote Command	[:SENSE] :EVM:ULINK:PROfile:USER<n>:PUCCh:PWRBoost <rel_ampl> [:SENSe] :EVM:ULINK:PROfile:USER<n>:PUCCh:PWRBoost?
Example	EVM:ULIN:PROF:USER1:PUCc:PWRB 0
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	0 dB
State Saved	Saved in instrument state.
Min	-100 dB
Max	100 dB
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Power Boost Couple This key determines whether all the PUCCH Slots will use the Common Power Boost value.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Power Boost
Mode	LTE
Remote Command	[:SENSE] :EVM:ULINK:PROfile:USER<n>:PUCCh:PWRBoost:COUPl e OFF ON 0 1 [:SENSe] :EVM:ULINK:PROfile:USER<n>:PUCCh:PWRBoost:COUPl e?
Example	EVM:ULIN:PROF:USER1:PUCc:PWRB:COUP ON

Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Auto Detect Power Boost This key allows you to select the Power Boost value to be used by all the PUCCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Couple Power Boost
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROFile:AUTO:PUCCh:PWRBoost <rel_ampl> [:SENSe] :EVM:ULINk:PROFile:AUTO:PUCCh:PWRBoost?
Example	EVM:ULIN:PROF:AUTO:PUCCh:PWRB 0
Preset	0 dB
State Saved	Saved in instrument state.
Min	-100 dB
Max	100 dB
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Common DMRS Group This key allows the user to enter the DMRS Group to be used by all the PUCCH Slots when DMRS Group Couple is On and Auto Detect is Off.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, DMRS Group
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUCCh:DMRS:GROup <integer> [:SENSe] :EVM:ULINk:PROFile:USER<n>:PUCCh:DMRS:GROup?
Example	EVM:ULIN:PROF:USER1:PUCCh:DMRS:GRO 1

Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	29
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

DMRS Group Couple This key determines whether all the PUCCH Slots will use the DMRS Group All value.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH,DMRS Group
Mode	LTE
Remote Command	[:SENSe]:EVM:ULINk:PROFile:USER<n>:PUCCh:DMRS:GROup:COU Ple OFF ON 0 1 [:SENSe]:EVM:ULINk:PROFile:USER<n>:PUCCh:DMRS:GROup:COU Ple?
Example	EVM:ULIN:PROF:USER1:PUCCh:DMRS:GRO:COUP ON
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Auto Detect DMRS Group This key allows the user to enter the DMRS Group to be used by all the PUCCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, DMRS Group
Mode	LTE
Remote Command	[:SENSe]:EVM:ULINk:PROFile:AUTO:PUCCh:DMRS:GROup <integer> [:SENSe]:EVM:ULINk:PROFile:AUTO:PUCCh:DMRS:GROup?

Example	EVM:ULIN:PROF:AUTO:PUC:DMRS:GRO 1
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	29
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Common DMRS Power Boost This key allows you to select the DMRS Power Boost value to be used by all the PUCCH Slots when DMRS Power Boost Couple is On and Auto Detect is Off.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH,Couple DMRS Power Boost
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUCCh:DMRS:PWRBoost <rel_ampl> [:SENSe] :EVM:ULINk:PROFile:USER<n>:PUCCh:DMRS:PWRBoost?
Example	EVM:ULIN:PROF:USER1:PUC:PWRB 0
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	0 dB
State Saved	Saved in instrument state.
Min	-100 dB
Max	100 dB
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

DMRS Power Boost Couple This key determines whether all the PUCCH Slots will use the Common DMRS Power Boost value.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, DMRS Power Boost
Mode	LTE

Remote Command	[:SENSE]:EVM:ULINK:PROFile:USER<n>:PUCCh:DMRS:PWRBoost:COUPle OFF ON 0 1 [:SENSe]:EVM:ULINK:PROFile:USER<n>:PUCCh:DMRS:PWRBoost:COUPle?
Example	EVM:ULIN:PROF:USER1:PUCCh:DMRS:PWRB:COUP ON
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Auto Detect DMRS Power Boost This key allows you to select the DMRS Power Boost value to be used by all the PUCCH Slots when Auto Detect is On.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH,Couple DMRS Power Boost
Mode	LTE
Remote Command	[:SENSE]:EVM:ULINK:PROFile:AUTO:PUCCh:DMRS:PWRBoost <rel_ampl> [:SENSe]:EVM:ULINK:PROFile:AUTO:PUCCh:DMRS:PWRBoost?
Example	EVM:ULIN:PROF:AUTO:PUCCh:PWRB 0
Preset	0 dB
State Saved	Saved in instrument state.
Min	-100 dB
Max	100 dB
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Add Slot Adds a new Slot in the position specified, if available. The new Slot will have its parameters set to the default values.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Slot
Mode	LTE
Remote Command	[:SENSE]:EVM:ULINK:PROFile:USER<n>:PUCCh:ADD:SLOT<integer>
Example	EVM:ULIN:PROF:USER1:PUCCh:ADD:SLOT 0

Notes	<p>The softkey for this parameter is an Immediate Action key. The value that is passed in by the SCPI command allows the user to position the slot. To use sub op codes for this purpose would be confusing to the user.</p> <p>As PUCCH has subframes, adding a slot will add the slot specified, if available, and the second slot in the subframe.</p>
Dependencies/Couplings	<p>The range of sub op code <n> values is determined by the number of Users the user has configured.</p> <p>The max number of Slots is 20 and once this has been reached this parameter will be disabled.</p> <p>If the user attempts to add a Slot to a User and the slot is already allocated an error message will be generated.</p>
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	99
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Delete Slot Deletes the currently selected Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Slot
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUCCh:SLOT<m>:DELete
Example	EVM:ULIN:PROF:USER1:PUCCh:SLOT1:DEL
Dependencies/Couplings	<p>This parameter will be disabled when there is only one Slot.</p> <p>The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Slots the user has configured. . Max value for n=25. Max Value for m=20. The range of sub op code <m> values is 0 – 19.</p> <p>If the user attempts to delete a Slot that does not exist an error message will be generated.</p>
Instrument S/W Revision	A.01.60 or later

Move Down Moves the currently selected Slot down .

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Slot
Mode	LTE

Dependencies/Couplings	This parameter will be disabled when there are no Slots defined or if the slot is at Slot0.
Instrument S/W Revision	A.01.60 or later

Move Up Moves the currently selected Slot up .

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH, Slot
Mode	LTE
Dependencies/Couplings	This parameter will be disabled when there are no Slots defined or if the slot is at Slot19.
Instrument S/W Revision	A.01.60 or later

Slot Position Sets the slot start position.

Key Path	SCPI Only
Mode	LTE
Remote Command	[:SENSE] :EVM:ULINK:PROfile:USER<n>:PUCCh:SLOT<m>:POSiti on <integer> [:SENSe] :EVM:ULINK:PROfile:USER<n>:PUCCh:SLOT<m>:POSiti on?
Example	EVM:ULIN:PROF:USER1:PUCCh:SLOT1:POS 5
Notes	As PUCCH has subframes, positioning the slot will position the slot specified, if available and also position the second slot in the subframe.
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Slots the user has configured. . Max value for n=25. Max Value for m=20. The range of sub op code <m> values is 0 – 19. If the user attempts to assign a slot position that is already allocated an error message will be generated.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	19
Instrument S/W Revision	A.01.60 or later

Slot First RB This key allows you to set the First Resource Block to be used by the selected

PUCCH Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, RB
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUCCh:SLOT<m>:RB <integer> [:SENSe] :EVM:ULINk:PROFile:USER<n>:PUCCh:SLOT<m>:RB?
Example	EVM:ULIN:PROF:USER1:PUCCh:RB 0
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Slots the user has configured. . Max value for n=25. Max Value for m=20. The range of sub op code <m> values is 0 – 19. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message. Max value dependent on Bandwidth.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	99
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Slot Format This key allows you to select the PUCCH Format type to be used for the selected PUCCH Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Format
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUCCh:SLOT<m>:FORMat T1 T1A T1B T2 T2A T2B [:SENSe] :EVM:ULINk:PROFile:USER<n>:PUCCh:SLOT<m>:FORMat ?
Example	EVM:ULIN:PROF:USER1:PUCCh:SLOT1:FORMAT F1
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Slots the user has configured. . Max value for n=25. Max Value for m=20. The range of sub op code <m> values is 0 – 19. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.

Preset	ONE
State Saved	Saved in instrument state.
Range	Type 1 Type 1a Type 1b Type 2 Type 2a Type 2b
Instrument S/W Revision	A.01.60 or later

Type 1 Selects 0 for the Format type to be used by the selected PUCCH Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Format
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Type 1a Selects 1 for the Format type to be used by the selected PUCCH Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Format
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Type 1b Selects 2 for the Format type to be used by the selected PUCCH Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Format
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Type 2 Selects 2a for the Format type to be used by the selected PUCCH Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Format
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Type 2a Selects 2b for the Format type to be used by the selected PUCCH Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Format
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Type 2b Selects 3 for the Format type to be used by the selected PUCCH Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Format
Mode	LTE

Instrument S/W Revision A.01.60 or later

Slot Cyclic Shift This key allows the user to enter the Cyclic Shift to be used by the selected PUCCH Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Cyclic Shift
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROFile:USER<n>:PUCCh:SLOT<m>:CSHift <integer> [:SENSe] :EVM:ULINK:PROFile:USER<n>:PUCCh:SLOT<m>:CSHift ?
Example	EVM:ULIN:PROF:USER1:PUCCh:SLOT1:CSH 1
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Slots the user has configured. . Max value for n=25. Max Value for m=20. The range of sub op code <m> values is 0 – 19. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	0
State Saved	Saved in instrument state.
Min	1
Max	11
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Slot OS This key allows the user to enter the OS to be used by the selected PUCCH Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, OS
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINK:PROFile:USER<n>:PUCCh:SLOT0 1 2 :OS INDeX0 INDeX1 INDeX2 [:SENSe] :EVM:ULINK:PROFile:USER<n>:PUCCh:SLOT0 1 2 :OS?
Example	EVM:ULIN:PROF:USER1:PUCCh:OS INDeX0
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. Max value for n=25. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	INDeX0

State Saved Saved in instrument state.
 Range Index 0 | Index1 | Index2
 Instrument S/W Revision A.01.60 or later

Index0 Selects Index0 for the OS to be used by the selected PUCCH Slot.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, OS**
 Mode LTE
 Instrument S/W Revision A.01.60 or later

Index1 Selects Index1 for the OS to be used by the selected PUCCH Slot.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, OS**
 Mode LTE
 Instrument S/W Revision A.01.60 or later

Index2 Selects Index2 for the OS to be used by the selected PUCCH Slot.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, OS**
 Mode LTE
 Instrument S/W Revision A.01.60 or later

Slot Power Boost This key allows you to set the Power Boost value for the selected PUCCH Slot.

Key Path **Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, Power Boost**

Mode LTE

Remote Command [:SENSe]:EVM:ULINk:PROfile:USER<n>:PUCCh:SLOT<m>:PWRBoo
 st <rel_ampl>
 [:SENSe]:EVM:ULINk:PROfile:USER<n>:PUCCh:SLOT<m>:PWRBoo
 st?

Example EVM:ULIN:PROF:USER1:PUCCh:SLOT1: PWRB 0

Dependencies/Couplings The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Slots the user has configured. . Max value for n=25. Max Value for m=20. The range of sub op code <m> values is 0 – 19.

If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.

Preset 0 dB

State Saved	Saved in instrument state.
Min	-100 dB
Max	100 dB
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Slot DMRS Group This key allows the user to enter the DMRS Group to be used by the selected PUCCH Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUSCH,DMRS Group
Mode	LTE
Remote Command	[:SENSe] :EVM:ULINk:PROFile:USER<n>:PUCCh:SLOT<m>:DMRS:GROup <integer> [:SENSe] :EVM:ULINk:PROFile:USER<n>:PUCCh:SLOT<m>:DMRS:GROup?
Example	EVM:ULIN:PROF:USER1:PUCCh:SLOT1:DMRS:GRO 1
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Slots the user has configured. . Max value for n=25. Max Value for m=20. The range of sub op code <m> values is 0 – 19. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	29
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Slot DMRS Power Boost This key allows you to set the DMRS Power Boost value for the selected PUCCH Slot.

Key Path	Meas Setup, Chan Profile Setup, Edit User Mapping, PUCCH, DMRS Power Boost
Mode	LTE

Remote Command	[:SENSE]:EVM:ULINK:PROFile:USER<n>:PUCCh:SLOT<m>:DMRS:PWRBoost <rel_ampl> [:SENSE]:EVM:ULINK:PROFile:USER<n>:PUCCh:SLOT<m>:DMRS:PWRBoost?
Example	EVM:ULIN:PROF:USER1:PUCC:SLOT1:DMRS:PWRB 0
Dependencies/Couplings	The range of sub op code <n> values is determined by the number of Users the user has configured. The range of sub op code <m> values is determined by the number of Slots the user has configured. . Max value for n=25. Max Value for m=20. The range of sub op code <m> values is 0 – 19. If the user attempts to remotely set or query a sub op code that is out of range this will result in an error message.
Preset	0 dB
State Saved	Saved in instrument state.
Min	–100 dB
Max	100 dB
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Advanced

This key displays a menu that allows you to select lesser used 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, More
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Mirror Freq Spectrum

This key allow the user to measure the signal at such an IF point in the receiver that is known to have a mirror-flipped signal.

Key Path	Meas Setup, More, Advanced
Mode	LTE
Remote Command	[:SENSE]:EVM:MIRRor:FREQuency:SPECTrum OFF ON 0 1 [:SENSE]:EVM:MIRRor:FREQuency:SPECTrum?
Example	EVM:MIRR:FREQ:SPEC OFF
Preset	OFF

State Saved Saved in instrument state.
Instrument S/W Revision A.01.60 or later

Extended Freq Lock Range

This key provides the ability to reduce the frequency lock range. When this parameter is on, the frequency lock range is two and a half times the subcarrier spacing or 37.5 kHz. When this parameter is off, it is reduced to one half the subcarrier spacing, or 7.5kHz, which allows faster processing time.

Key Path **Meas Setup, More, Advanced**
Mode LTE
Remote Command [:SENSe]:EVM:EXTended:FREQuency:LOCK:RANGe OFF|ON|0|1
 [:SENSe]:EVM:EXTended:FREQuency:LOCK:RANGe?
Example EVM:EXT:FREQ:LOCK:RANGe OFF
Preset OFF
State Saved Saved in instrument state.
Instrument S/W Revision A.01.60 or later

Equalizer Training

This key tells the demodulator whether or not to equalize the signal (i.e. whether or not to compensate for measured channel frequency response).

Key Path **Meas Setup, More, Advanced**
Mode LTE
Remote Command [:SENSe]:EVM:EQUalizer:TRAIning OFF|RS
 [:SENSe]:EVM:EQUalizer:TRAIning?
Example EVM:EQU:TRA RS
Preset RS
State Saved Saved in instrument state.
Range None | RS
Instrument S/W Revision A.01.60 or later

Off Selects no Equalizer Training.

Key Path **Meas Setup, More, Advanced, Equalizer Training**
Mode LTE
Instrument S/W Revision A.01.60 or later

RS Selects RS Equalizer Training.

Key Path	Meas Setup, More, Advanced, Equalizer Training
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Moving Average Filter This key sets the value and state of the Moving Avg Filter.

Key Path	Meas Setup, Sync/Format Setup
Mode	LTE
Remote Command	[:SENSe]:EVM:EQUalizer:TRaining:MAFilter:LENGth <integer> [:SENSe]:EVM:EQUalizer:TRaining:MAFilter:LENGth? [:SENSe]:EVM:EQUalizer:TRaining:MAFilter OFF ON 0 1 [:SENSe]:EVM:EQUalizer:TRaining:MAFilter?
Example	EVM:EQU:TRA:MAF:LENG 19 EVM:EQU:TRA:MAF ON
Notes	This parameter will always clip to an odd number.
Preset	19 ON
State Saved	Saved in instrument state.
Min	1
Max	399
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Pilot Tracking

This key displays a menu of several Pilot Tracking setup parameters.

Key Path	Meas Setup, More, Advanced
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Track Amplitude When Track Amplitude is selected, the analyzer applies pilot subcarrier amplitude error correction to the pilot and data subcarriers. This is in addition to Track Phase and Track Timing error correction if selected.

This parameter specifies whether the analyzer tracks amplitude changes in the pilot

subcarriers. When true, the Common Pilot Error trace will show the amplitude tracking in the magnitude portion of the trace

Key Path	Meas Setup, More, Advanced, Pilot Tracking
Mode	LTE
Remote Command	[:SENSE] :EVM:PILOt:TRACk:AMPLitude OFF ON 0 1 [:SENSE] :EVM:PILOt:TRACk:AMPLitude?
Example	EVM:PILOt:TRAC:AMPL ON
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Track Phase .When Track Phase is selected, the analyzer applies pilot subcarrier phase error correction to the pilot and data subcarriers. This is in addition to Track Amplitude and Track Timing error correction if selected.

Key Path	Meas Setup, More, Advanced, Pilot Tracking
Mode	LTE
Remote Command	[:SENSE] :EVM:PILOt:TRACk:PHASe OFF ON 0 1 [:SENSE] :EVM:PILOt:TRACk:PHASe?
Example	EVM:PILOt:TRAC:PHASe ON
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Track Timing When Track Timing is selected the analyzer applies pilot subcarrier timing error correction (frequency offset correction) to the pilot and data subcarriers. This is in addition to Track Amplitude and Track Phase error correction if selected.

Key Path	Meas Setup, More, Advanced, Pilot Tracking
Mode	LTE
Remote Command	[:SENSE] :EVM:PILOt:TRACk:TIMing OFF ON 0 1 [:SENSE] :EVM:PILOt:TRACk:TIMing?
Example	EVM:PILOt:TRAC:TIM ON
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Symbol Timing Adjust

This key tells the demodulator whether or not to equalize the signal (i.e. whether or not to compensate for measured channel frequency response).

Key Path	Meas Setup, More, Advanced
Mode	LTE
Remote Command	[:SENSE] :EVM:SYMBOL:TIMing:ADJust MAX MIN START END CENTer FFTSize [:SENSE] :EVM:SYMBOL:TIMing:ADJust?
Example	EVM:SYMB:TIM:ADJ MAX
Preset	MAX
State Saved	Saved in instrument state.
Range	Max of EVM Win Start/End Min of EVM Win Start/End EVM Window Start EVM Window End EVM Window Center %FFT Size
Instrument S/W Revision	A.01.60 or later

Max of EVM Window Start/End Selects Max of EVM Window Start/End for Symbol Timing Adjust .

Key Path	Meas Setup, More, Advanced, Symbol Timing Adjust
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Min of EVM in Start/End Selects Min of EVM Window Start/End for Symbol Timing Adjust .

Key Path	Meas Setup, More, Advanced, Symbol Timing Adjust
Mode	LTE
Instrument S/W Revision	A.01.60 or later

EVM Window Start Selects EVM Window Start for Symbol Timing Adjust .

Key Path	Meas Setup, More, Advanced, Symbol Timing Adjust
Mode	LTE
Instrument S/W Revision	A.01.60 or later

EVM Window Stop Selects EVM Window Stop for Symbol Timing Adjust .

Key Path	Meas Setup, More, Advanced, Symbol Timing Adjust
Mode	LTE
Instrument S/W Revision	A.01.60 or later

EVM Window Center Selects EVM Window Center for Symbol Timing Adjust .

Key Path	Meas Setup, More, Advanced, Symbol Timing Adjust
Mode	LTE
Instrument S/W Revision	A.01.60 or later

% FFT Size Selects %FFT Size for Symbol Timing Adjust which allows the users to enter the value. The value used is User Symbol Timing Adjust.

Key Path	Meas Setup, More, Advanced, Symbol Timing Adjust
Mode	LTE
Instrument S/W Revision	A.01.60 or later

User Symbol Timing Adjust

Key Path	Meas Setup, More, Advanced, Symbol Timing Adjust, User Defined
Mode	LTE

Remote Command [:SENSe] :EVM:SYMBol:TIMing:ADJust:USER <percent >
[:SENSe] :EVM:SYMBol:TIMing:ADJust:USER?

Example EVM:SYMB:TIM:ADJ:USER -3.125

Preset -3.125 %

State Saved Saved in instrument state.

Min -25 %

Max 0 %

Test MIN/MAX/DEF No

Instrument S/W Revision A.01.60 or later

EVM Window Length

This key sets the EVM Window Length

Key Path	Meas Setup, More, Advanced
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Mode	LTE
Remote Command	[:SENSE]:EVM:WINDow:LENGth GPP CUSTom [:SENSe]:EVM:WINDow:LENGth?
Example	EVM:WIND:LENG GPP
Preset	GPP
State Saved	Saved in instrument state.
Range	RS None
Instrument S/W Revision	A.01.60 or later

3GPP Selects 3GPP for EVM Window Length .

Key Path	Meas Setup, More, Advanced, EVM Window Length
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Custom Selects Custom for EVM Window Length, which allows the users to enter the value. The value used is EVM Window Length Custom.

Key Path	Meas Setup, More, Advanced, EVM Window Length
Mode	LTE
Instrument S/W Revision	A.01.60 or later

EVM Window Length Custom

Key Path	Meas Setup, More, Advanced, EVM Window Length, Custom
Mode	LTE
Remote Command	[:SENSE]:EVM:WINDow:LENGth:CUSTom <int > [:SENSe]:EVM:WINDow:LENGth:CUSTom?
Example	EVM:WIND:LENG:CUST 1
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	512
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Report EVM in dB

This key allows switching between EVM reporting in percentage and dB.

Key Path	Meas Setup, More, Advanced, More
Mode	LTE
Remote Command	[:SENSe] :EVM:REPort:DB OFF ON 0 1 [:SENSe] :EVM:REPort:DB?
Example	EVM:REP:DB OFF
Preset	OFF
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Power Boost Normalize

This key determines if Power Boost Normalize is used.

Key Path	Meas Setup, More, Advanced, More
Mode	LTE
Remote Command	[:SENSe] :EVM:POWer:BOOSt:NORMAlize OFF ON 0 1 [:SENSe] :EVM:POWer:BOOSt:NORMAlize?
Example	:EVM:POW:BOOS:NORM OFF
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Time Scale Factor

Key Path	Meas Setup, More, Advanced, More
Mode	LTE
Remote Command	[:SENSe] :EVM:TIME:SCALe:FACTor <value > [:SENSe] :EVM:TIME:SCALe:FACTor?
Example	EVM:TIME:SCAL:FACT 1
Preset	1
State Saved	Saved in instrument state.
Min	0.0625

Max	16
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Meas Preset

This immediately sets all measurement parameters to their Preset values. For more information, see the section under the Preset key in the Utility section.

Key Path	Meas Setup, More
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Peak Search

There is no measurement unique Peak Search SCPI/capability.

For more information see the LTE - Additional Measurement Functions [“Peak Search”](#) on [page 546](#) for a description of this function.

Key Path	Peak Search
Mode	LTE
Instrument S/W Revision	A.01.60 or later

SPAN X Scale

This menu has softkeys for selecting measurement span and also for scaling of the X axis.

For more information see the LTE - Additional Measurement Functions [“SPAN X Scale”](#) on page 558 for a description of this function.

Key Path	Front-panel key
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Span

This controls the frequency span of the measurement. See the **FREQ Channel** section for details on how this interacts with Start, Stop, and Center frequencies.

For more information see the LTE - Additional Measurement Functions, [Span X Scale, “Span”](#) on page 558 for a description of this function.

Key Path	SPAN X Scale
Mode	LTE
Preset	7.68 MHz (limited by hardware, for example, 10 MHz or 25 MHz with Option B25 for RF Input)
Instrument S/W Revision	A.01.60 or later

Sweep / Control

This key displays a menu allowing you to control time-related measurement parameters, and to pause or resume the measurement. . There are no measurement unique SCPI/features.

For more information see the LTE - Additional Measurement Functions “Sweep / Control” on page 557 for a description of this function.

Key Path	Sweep/Control
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Trace/Detector

This key allows you to select the results shown in the trace windows.

For more information see the LTE - Additional Measurement Functions [“Trace/Detector”](#) on page 567 for a description of this function.

Key Path	Hard key
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Data

This accesses a menu of Trace data choices for the selected trace.

The following are the SCPI string forms for the Data types that are specific to this measurement, in alphabetical order:

Trace data soft key name	SCPI string form
CCDF	"CCDF1"
CDF	"CDF1"
Ch Freq Resp	"Ch Freq Resp1"
Ch Freq Resp Diff	"Ch Freq Resp Diff1"
Common Track Error	"Common Track Error1"
Common Tracking Error	"Common Tracking Error1"
Eq Ch Freq Resp	"Eq Ch Freq Resp1"
Eq Ch Resp Diff	"Eq Ch Resp Diff1"
Eq Impulse Resp	"Eq Impulse Resp1"
Eq Impulse Response	"Eq Impulse Response1"
Error Summary	"Error Summary"
Error Vector Spectrum	"Error Vector Sppectrum1"
Error Vector Time	"Error Vector Time1"
Frame Summary	"Frame Summary1"
IQ Meas	"IQ Meas1"
IQ Meas Time	"IQ Meas Time1"
IQ Ref	"IQ Ref1"

LTE Modulation Analysis
Trace/Detector

IQ Ref Time	"IQ Ref Time1"
Info Table	"Info Table1"
Inst Eq Ch Freq Resp	"Inst Eq Ch Freq Resp1"
Inst Eq Ch Freq Resp Diff	"Inst Eq Ch Freq Resp Diff1"
Inst Spectrum	"Inst Spectrum1"
PDF	"PDF1"
RB Error Mag Spectrum	"RB Error Mag Spectrum1"
RB Error Mag Time	"RB Error Mag Time1"
RB Power Spectrum	"RB Power Spectrum1"
RB Power Time	"RB Power Time1"
RMS Error Vector Spectrum	"RMS Error Vector Spectrum1"
RMS Error Vector Time	"RMS Error Vector Time1"
Raw Main Time	"Raw Main Time1"
Search Time	"Search Time1"
Spectrum	"Spectrum1"
Symbols	"Symbols1"
Time	"Time1"
Key Path	Trace/Detector
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Pre Demod

This key accesses the Trace Data choices which show pre-demodulation results.

Key Path	Trace/Detector, Data
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Spectrum Averaged FFT of the Time waveform.

Key Path	Trace/Detector, Data, Pre Demod
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Inst Spectrum The FFT of the time waveform for the current measurement. “Inst” or Instantaneous refers to this result not being averaged like the Spectrum Trace Data result.

Key Path	Trace/Detector, Data, Pre Demod
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Search Time The Search Length long time record acquired for the current measurement.

Key Path	Trace/Detector, Data, Pre Demod
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Time This is the time data corresponding to the measurement interval used to compute demod results

Key Path	Trace/Detector, Data, Pre Demod
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Raw Main Time The raw time record acquired for the current measurement. This data is unprocessed and includes additional points acquired for settling of the filters involved in subsequent processing, such as the demodulation filtering.

Key Path	Trace/Detector, Data, Pre Demod
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Statistical

This key accesses the Trace Data choices which show statistical results.

Key Path	Trace/Detector, Data
Mode	LTE
Instrument S/W Revision	A.01.60 or later

CCDF The Complementary, Cumulative Density function (CCDF) for the selected input channel.

The analyzer plots CCDF using units of percent (%) for the y-axis and power (dB) for the

x-axis. Power on the x-axis is relative to the signal average power.

Key Path	Trace/Detector, Data, Statistical
Mode	LTE
Instrument S/W Revision	A.01.60 or later

CDF The Cumulative Density Function (CDF) for the selected input channel. CDF is computed by integrating the PDF (Probability Density Function).

Key Path	Trace/Detector, Data, Statistical
Mode	LTE
Instrument S/W Revision	A.01.60 or later

PDF The Probability Density Function (PDF) for the selected input channel. PDF indicates the probability that a given level has occurred.

Key Path	Trace/Detector, Data, Statistical
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Demod

This key accesses the Trace Data choices which show general demodulation results.

Key Path	Trace/Detector, Data
Mode	LTE
Instrument S/W Revision	A.01.60 or later

IQ Meas IQ Meas is the measured IQ symbol values of the subcarriers. There is one complex value for each subcarrier for each symbol in the burst.

Normally this trace data is displayed as a constellation. The constellation display shows both data and pilot subcarriers, the pilots and data values are shown with different colors.

Key Path	Trace/Detector, Data, Demod
Mode	LTE
Instrument S/W Revision	A.01.60 or later

IQ Ref IQ Ref is the reference (ideal) IQ values of the subcarriers. There is one complex value for each subcarrier for each symbol in the burst.

Normally this trace data is displayed as a constellation. The constellation shows both data

and pilot subcarrier symbols, the pilots and data values are shown with different colors.

Key Path	Trace/Detector, Data, Demod
Mode	LTE
Instrument S/W Revision	A.01.60 or later

IQ Meas Time IQ Meas and IQ Ref traces show signal levels as a function of subcarriers or samples/subcarriers. Signals levels on different OFDM symbols are shown as different points on the same vertical line corresponding to a subcarrier or subcarrier/sample. There is also value in showing these traces as a function of symbols on the X-axis. For each symbol, different subcarriers or samples will be shown as different points on the same vertical line.

Key Path	Trace/Detector, Data, Demod
Mode	LTE
Instrument S/W Revision	A.01.60 or later

IQ Ref Time IQ Ref Time is similar to IQ Meas Time, except that the points plotted are the expected signal levels instead of the measured ones.

Key Path	Trace/Detector, Data, Demod
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Demod Err (Error)

This key accesses the Trace Data Demod Error choices which show general demodulation results.

Key Path	Trace/Detector, Data
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Error Vector Time This trace shows each of the individual signal error vectors for each subcarrier and symbol vs. Time (symbol) and frequency (subcarrier). Each error vector is the vector difference, for that subcarrier at that symbol-time, between the corresponding IQ Meas value and the IQ Ref value.

On this trace, the individual error vectors are plotted vs Time (symbol). So at each valid symbol, there is a point plotted for each valid subcarrier (52 total, since subcarrier 0 is not used.) In addition, a white trace is drawn, where each point is the RMS average over the valid subcarriers, which is the same result as is plotted separately as RMS Error Vector

Time.

Key Path	Trace/Detector, Data, Demod Error
Mode	LTE
Instrument S/W Revision	A.01.60 or later

RMS Error Vector Time The difference between IQ Meas and IQ Ref is the error vector (which would have a complex value) at each subcarrier at each symbol-time. This trace is the RMS average of the error vector for each valid subcarrier at the plotted symbol, the same data shown as a white trace shown in Error Vector Time.

Key Path	Trace/Detector, Data, Demod Error
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Error Vector Spectrum This trace, like Error Vector Time shows each of the individual signal error vectors for each subcarrier and symbol vs. Time (symbol) and frequency (subcarrier). Each error vector is the vector difference, for that subcarrier at that symbol-time, between the corresponding IQ Meas value and the IQ Ref value.

On this trace, the individual error vectors are plotted vs frequency (subcarrier). So at each valid subcarrier, there is a point plotted for each valid symbol. Note that subcarrier 0 is not plotted since it is not used. In addition, a white trace is drawn, where each point is the RMS average over the valid symbols, which is the same result as is plotted separately as RMS Error Vector Spectrum.

Key Path	Trace/Detector, Data, Demod Error
Mode	LTE
Instrument S/W Revision	A.01.60 or later

RMS Error Vector Spectrum This trace is the RMS average of the error vector for each valid symbol at the plotted subcarrier, the same data shown as a white trace shown in Error Vector Time. Note that subcarrier 0 is not plotted since it is not used.

Key Path	Trace/Detector, Data, Demod Error
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Common Tracking Error This trace shows the small scale deviations from the averaged channel response occurring from one symbol to another.

Key Path	Trace/Detector, Data, Demod Error
Mode	LTE

Instrument S/W Revision A.01.60 or later

RB Error Mag Spectrum This trace will show EVM (calculated as RMS average over one RB and one slot) and as functions of RBs on the X-axis and multiple slots for each RB. This is a frequency-domain trace and will be coupled only to other frequency-domain traces (and not mixed-domain traces).

Key Path **Trace/Detector, Data, Demod Error**

Mode LTE

Instrument S/W Revision A.01.60 or later

RB Error Mag Time This trace will show EVM (calculated as RMS average over one RB and one slot) and as functions of RBs on the X-axis and multiple slots for each RB. This is a frequency-domain trace and will be coupled only to other frequency-domain traces (and not mixed-domain traces).

Key Path **Trace/Detector, Data, Demod Error, More**

Mode LTE

Instrument S/W Revision A.01.60 or later

RB Power Spectrum This trace will show power levels (calculated as RMS average over one RB and one slot) as functions of RBs on the X-axis and multiple slots for each RB. This is a frequency-domain trace and will be coupled only to other frequency-domain traces (and not mixed-domain traces).

Key Path **Trace/Detector, Data, Demod Error, More**

Mode LTE

Instrument S/W Revision A.01.60 or later

RB Power vs Time This trace will show power levels (calculated as RMS average over one RB and one slot) as functions of slots on the X-axis and multiple RBs for each slot. This is a frequency-domain trace and will be coupled only to other frequency-domain traces (and not mixed-domain traces).

Key Path **Trace/Detector, Data, Demod Error, More**

Mode LTE

Instrument S/W Revision A.01.60 or later

Tables

This key accesses the Trace Data choices which are in tabular form, including

demodulated symbols tables.

Key Path	Trace/Detector, Data
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Error Summary The Error Summary table shows some metrics calculated from signal demod. The metrics are subject to averaging, unless indicated otherwise. The following are the metrics shown.

EVM

EVM Symbol TimeAdjust

Peak EVM

Peak EVM location symbol number

Peak EVM subcarrier number

Data EVM

RS EVM

Freq Err

Sync Corr

Common Tracking Error

Sym Clk Err

Time Offset (not averaged)

IQ Offset

IQ Gain Imb

IQ Quad Err

IQ Time Skew

CP Length (not averaged)

RS-OS/PRS (not averaged) (downlink only)

Cell ID (not averaged) (downlink only)

Cell ID Group/Sector (not averaged) (downlink only)

Result name	Displayed Unit	Remote Name	Remote Unit
EVM RCE	%rms*	EVMRCE	%rms
EVM Symbol Timing Adjust	none	EVMSymTimeAdj	none

EVM Pk	%	EVMPeak	%
Peak EVM location symbol number	sym	EVMPeakInx	sym
Peak EVM subcarrier number	subcar	EVMPeakSubcar Idx	subcar
Data EVM	%rms*	DataEVM	%rms
RS EVM	%rms*	RSEVM	%rms
Frequency Error	Hz	FreqErr	Hz
Sync Corr	%	SyncCorr	%
Common Tracking Error	%rms	CPE	%rms
Symbol Clock Err	ppm	SymClkErr	ppm
Time Offset	s	TimeOffset	sec
IQ Offset	dB	IQOffset	dB
IQ Gain Imbalance	dB	IQGainImb	dB
IQ Quadrature Error	deg	IQQuadErr	deg
IQ Timing Skew	s	IQTimeSkew	sec
CP Length Mode	None	CPLengthMode	None
RS-OS / RS	None	RSOSPRS	None
Cell ID	None	CellId	None
Cell ID Group/Sector	None	CellIdGroupSect or	None

* displayed in dB when Report EVM in dB parameter is On

The error summary values may be obtained using the CALC:EVM:DATA:TABLE commands. See Data Queries, CALCulate:DATA for more details.

Key Path	Trace/Detector, Data, Tables
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Frame Summary This table shows certain characteristics of each of the logical channels. The list of channels shown is different for Downlink and Uplink. If auto-detection is selected, the list contains only PDSCH1–3, corresponding to the three modulation formats. If a channel is not found in the measurement interval under consideration, it is marked with a ‘...’. Each of the channels will have the same color coding as used in the IQ demod traces. The following are the characteristics that will be shown in the Frame Summary Table

Channel Name

Error Vector Magnitude

Relative Power Level

Modulation Format

Number of RBs occupied

When the link direction is downlink, the following channels will show in the Frame Summary

PSCH

SSCH

PBCH

PCFICH

PDCCH

RS

PDSCH1 to PDSCHn

Non-Alloc

Result name	Displayed Unit	Remote Name	Remote Unit
PSCH EVM	%rms	PSCHEVM	%rms
PSCH Power	db	PSCHPower	db
PSCH Mod Format	none	PSCHModFmt	none
PSCH Num Rb	none	PSCHNumRb	none
SSCH EVM	%rms	SSCHEVM	%rms
SSCH Power	db	SSCHPower	db
SSCH Mod Format	none	SSCHModFmt	none
SSCH Num Rb	none	SSCHNumRb	none
PBCH EVM	%rms	PBCHEVM	%rms
PBCH Power	db	PBCHPower	db
PBCH Mod Format	none	PBCHModFmt	none
PBCH Num Rb	none	PBCHNumRb	none
PCFICH EVM	%rms	PCFICHEVM	%rms
PCFICH Power	db	PCFICHPower	db
PCFICH Mod Format	none	PCFICHModFmt	none
PCFICH Num Rb	none	PCFICHNumRb	none

PDCCH EVM	%rms	PDCCHEVM	%rms
PDCCH Power	db	PDCCHPower	db
PDCCH Mod Format	none	PDCCHModFmt	none
PDCCH Num Rb	none	PDCCHNumRb	none
RS EVM	%rms	RSEVM	%rms
RS Power	db	RSPower	db
RS Mod Format	none	RSModFmt	none
RS Num Rb	none	RSNumRb	none
PDSCHn EVM	%rms	PDSCHnEVM	%rms
PDSCHn Power	db	PDSCHnPower	db
PDSCHn Mod Format	none	PDSCHnModFmt	none
PDSCHn Num Rb	none	PDSCHnNumRb	none
Inactive EVM	%rms	InactiveEVM	%rms
Inactive Power	db	InactivePower	db
Inactive Mod Format	none	InactiveModFmt	none
Inactive Num Rb	none	InactiveNumRb	none

When the link direction is uplink, the following are the channels that will show up in the Frame Summary

PUSCH DM-RS

PUCCH

PUSCH1 to PUSCHn

Non-Alloc

Result name	Displayed Unit	Remote Name	Remote Unit
DMRS EVM	%rms	DMRSEVM	%rms
DMRS Power	db	DMRSPower	db
DMRS Mod Format	none	DMRSModFmt	none
DMRS Num Rb	none	DMRSNumRb	none
PUCCH EVM	%rms	PUCCH EVM	%rms
PUCCH Power	db	PUCCH Power	db
PUCCH Mod Format	none	PUCCH ModFmt	none
PUCCH Num Rb	none	PUCCH NumRb	none

PUSCHn EVM	%rms	PUSCHn EVM	%rms
PUSCHn Power	db	PUSCHn Power	db
PUSCHn Mod Format	none	PUSCHn ModFmt	none
PUSCHn Num Rb	none	PUSCHn NumRb	none
Inactive EVM	%rms	InactiveEVM	%rms
Inactive Power	db	InactivePower	db
Inactive Mod Format	none	InactiveModFmt	none
Inactive Num Rb	none	InactiveNumRb	none

These values are never averaged; they always show the results of the current measurement. These results are valid only for the current measurement interval.

Key Path	Trace/Detector, Data, Tables
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Symbols This table will show the demodulated symbols over the measurement interval. It will display one value per subcarrier for downlink and one value per sample/subcarrier for uplink. In uplink, this is a mixed-domain trace and will couple only with other mixed-domain traces (and not frequency domain traces).

Key Path	Trace/Detector, Data, Tables
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Response

This key accesses the Trace Data choices which show equalizer response results.

Key Path	Trace/Detector, Data
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Eq Ch Frequency Response This trace will show the frequency response of the channel derived from the equalizer coefficients, as a function of subcarriers. How the results are computed depends on the choice of Equalizer Training on the Advanced tab. Equalizer training off and that based on RS alone should yield the same trace, while that based on RS+Data should yield a different trace. This is a frequency domain trace and will be

coupled only to other frequency domain traces (and not mixed-domain traces).

Key Path	Trace/Detector, Data, Response
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Inst Eq Ch Freq Resp As Eq Ch Frequency Response, but this trace is not averaged.

Key Path	Trace/Detector, Data, Response
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Eq Ch Resp Diff This is the adjacent difference of the channel frequency response. It shows the ratio of the magnitude of the channel response at adjacent subcarriers, expressed in dB so that an ideal response is flat at 0 dB. This trace is real valued. Because this is adjacent differences, the total number of points in the trace is one less than the number of subcarriers. This trace is averaged if averaging is turned on. This is a frequency domain trace and will be coupled only to other frequency domain traces (and not mixed-domain traces).

Key Path	Trace/Detector, Data, Response
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Inst Eq Ch Freq Resp Diff As Eq Ch Resp Diff, but this trace is not averaged.

Key Path	Trace/Detector, Data, Response
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Eq Impulse Response This shows the impulse response of the equalization filter. The equalizer impulse response is computed by taking the reciprocal of the channel equalizer frequency response, performing data filtering and computations that produce a result length of 4x the FFT length, and then converting to the time domain. The Eq Impulse Response is the computed channel impulse response used to compensate for signal channel response degradation.

Key Path	Trace/Detector, Data, Response
Mode	LTE
Instrument S/W Revision	A.01.60 or later

MIMO

This key accesses the Trace Data choices which show MIMO results.

Key Path	Trace/Detector, Data, More
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Info Table The measurement will automatically detect the presence of signals from all the antenna ports and measure certain metrics related to them only if the antenna port parameter (refer to TX Antenna Port) is selected to be “auto”. The results will be reported in the form of the following table. The number of columns will depend on the number of transmit antennas selected. Antenna ports that have not contributed to the composite signal will have their corresponding columns displayed simply as “---”.

	Tx0/Rx0	Tx1/Rx0	Tx2/Rx0	Tx3/Rx0
RS Power				
RS EVM				
CPE				
Timing				
Phase				
Freq. Error				
Sym Clock Error				

Key Path	Trace/Detector, Data, MIMO
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Ch Freq Resp This trace will show the channel responses of the paths from all transmitter antenna ports that are auto-detected to exist in the signal. It will comprise of up to 4 traces overlaid on top of each other, possibly with some color coding.

Key Path	Trace/Detector, Data, MIMO
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Ch Freq Resp Diff This trace will show the channel response differences of the paths from all transmitter antenna ports that are auto-detected to exist in the signal. It will comprise

of up to 4 traces overlaid on top of each other, possibly with some color coding.

Key Path	Trace/Detector, Data, MIMO
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Eq Impulse Resp This trace will show the Eq. impulse responses of the paths from all transmitter antenna ports that are auto-detected to exist in the signal. It will comprise of up to 4 traces overlaid on top of each other, possibly with some color coding

Key Path	Trace/Detector, Data, MIMO
Mode	LTE
Instrument S/W Revision	A.01.60 or later

MIMO Common Tracking Error This trace will show the common pilot errors of the paths from all transmitter antenna ports that are auto-detected to exist in the signal. It will comprise of up to 4 traces overlaid on top of each other, possibly with some color coding.

Key Path	Trace/Detector, Data, MIMO
Mode	LTE
Instrument S/W Revision	A.01.60 or later

ACP

This brings up a selection of the ACP result traces. For more information, see Trace/Detector, Data, ACP

Key Path	Trace/Detector, Data, ACP
Mode	LTE
Instrument S/W Revision	A.01.60 or later

OBW

This brings up a selection of the OBW result traces. For more information, see LTE - Additional Measurement Functions, Trace/Detector, Data, OBW.

Key Path	Trace/Detector, Data, OBW
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Register

This brings up a selection of the Data Registers. For more information, see LTE -

Additional Measurement Functions, Trace/Detector, Data, Register.

Key Path	Trace/Detector, Data, Register
Mode	LTE
Instrument S/W Revision	A.01.60 or later

No Data

A blank display is shown. For more information, see LTE - Additional Measurement Functions, Trace/Detector, Data, No Data.

Key Path	Trace/Detector, Data, No Data
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Trigger

Triggering is used to determine when a measurement should start taking data. There are several available trigger sources. For each trigger source, there are associated setup parameters. Typically, a trigger event is generated when a signal (or a characteristic of the signal) crosses a defined trigger level (or threshold) on a rising or falling slope. The measurement begins at a specified time delay from the trigger point. The delay may be negative, allowing pre-trigger data to be taken. Each trigger source has associated its own trigger level, slope, and delay settings.

This key displays a menu allowing you to control triggering.

For more information see the LTE - Additional Measurement Functions [“Trigger”](#) on page 608 for a description of this function.

Key Path	Trigger
Mode	LTE
Instrument S/W Revision	A.01.60 or later

View/Display

LTE Modulation 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 Basic or other Preset Views to view frequently used results, or to provide a familiar starting point from which you may customize your own view.

The view setup can be changed by selections from the View/Display menu, including by pressing View Preset: Basic.

Key Path	Front-panel key
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Display

This key invokes the View/Display, Display menu.

For more information see the LTE - Additional Measurement Functions [“View/Display” on page 619](#) for a description of this function..

Key Path	View/Display
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Layout

This key invokes the View/Display, Layout menu.

For more information see the LTE - Additional Measurement Functions [“View/Display” on page 619](#) for a description of this function..

Key Path	View/Display
Mode	LTE
Instrument S/W Revision	A.01.60 or later

Preset View

This key accesses a menu of Preset Views that provide a set of trace data displays designed to help accomplish a specific measurement objective. The details of each Preset View are

provided in the Help for the individual views.

Key Path	(SCPI only)
Mode	LTE
Remote Command	:DISPlay:EVM:VIEW:PRESet BASic SUMMary RBSLot SUBCarrier MIMO
Example	DISP:EVM:VIEW:PRES BAS
Preset	BASic
Instrument S/W Revision	A.01.60 or later

Preset View: Basic

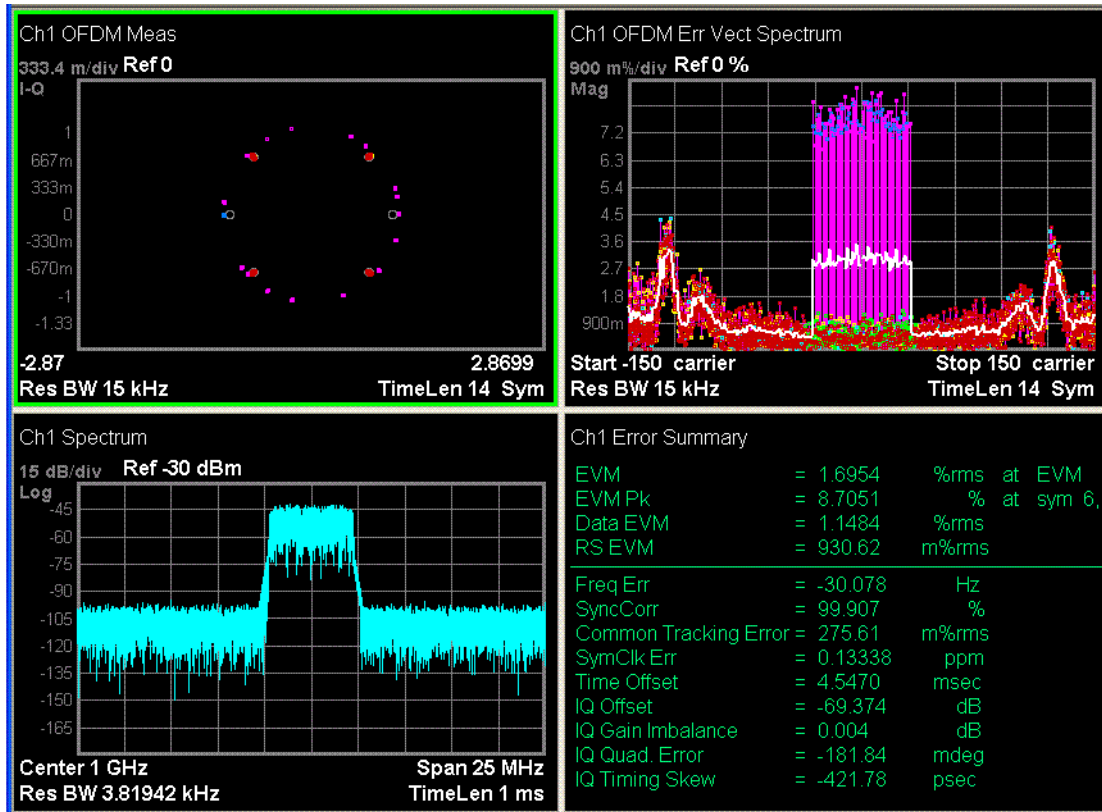
This preset view consists of the following traces in a Grid 2x2 layout:

1. IQ Meas
2. Spectrum
3. Error Vector Spectrum
4. Error Summary
5. This layout is the layout set by Meas Preset and is good for insuring that the signal is being demodulated correctly, as well as giving visibility to many basic demodulation setup problems

The Preset View: Basic softkey does an immediate action of changing the layout and view to this state. This Preset View is an action, not a state.

Key Path	View/Display
Mode	LTE
Remote Command	:DISPlay:EVM:VIEW:PRESet BASic
Example	DISP:EVM:VIEW:PRES BAS
Instrument S/W Revision	A.01.60 or later

Figure 7-1 Preset View - Basic



Preset View: Meas Summary

This preset view consists of the following traces in a Stacked layout:

Error Summary

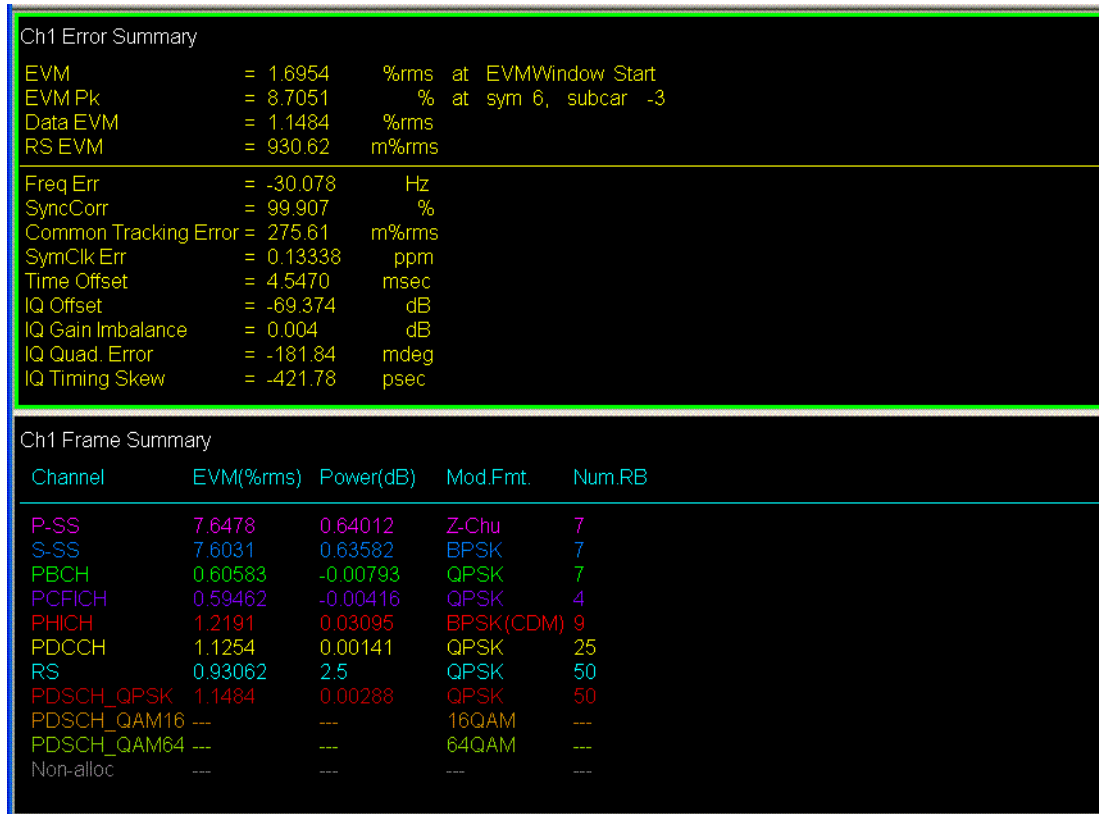
Frame Summary

This layout provides the full list of the composite result metrics and characteristics of each of the logical channels.

The Preset View: Meas Summary softkey does an immediate action of changing the layout and view to this state. This Preset View is an action, not a state.

Key Path	View/Display
Mode	LTE
Remote Command	:DISPlay:EVM:VIEW:PRESet SUMMary
Example	DISP:EVM:VIEW:PRE S SUMM
Instrument S/W Revision	A.01.60 or later

Figure 7-2 Preset View - Meas Summary



Preset View: RB Slot Meas

This preset view consists of the following traces in a Grid 2x2 layout:

RB Power vs Spectrum

1. RB Error Mag Spectrum

RB Power vs Time

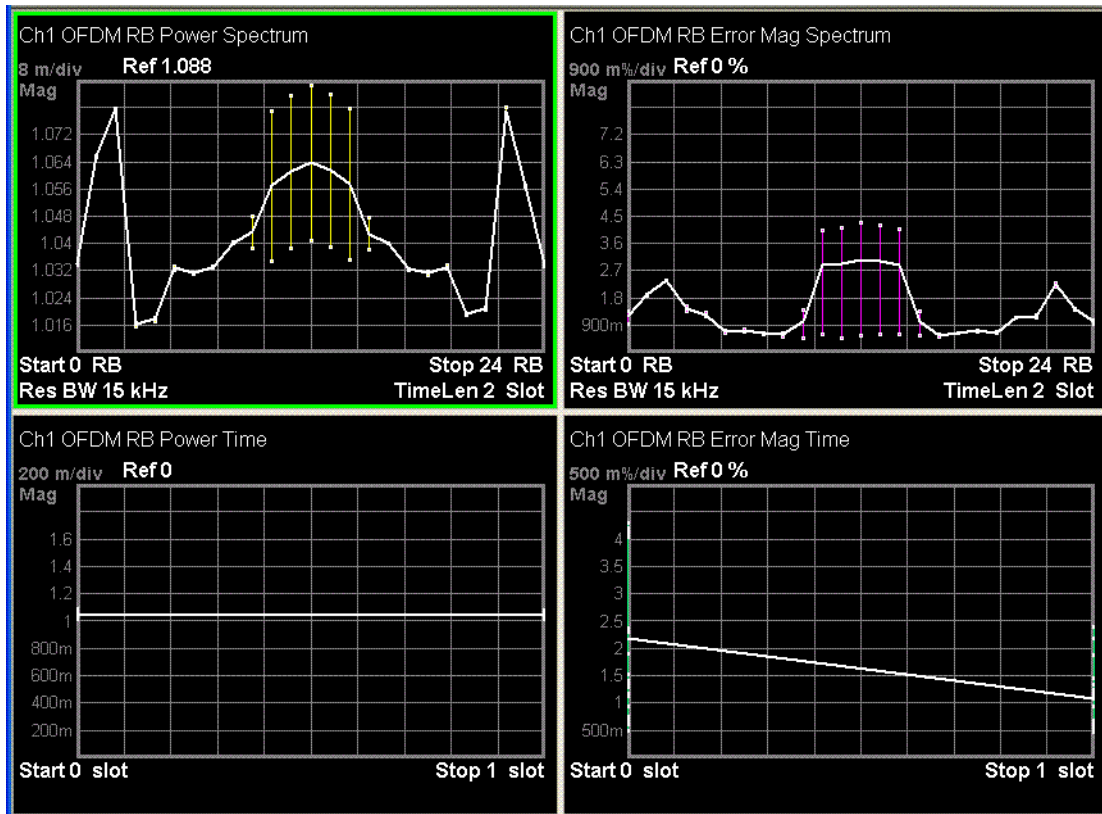
1. RB Error Mag Time

This layout provides the details on the Resource Block.

The Preset View: RB Slot Meas softkey does an immediate action of changing the layout and view to this state. This Preset View is an action, not a state.

Key Path	View/Display
Mode	LTE
Remote Command	:DISPlay:EVM:VIEW:PRESet RBSlot
Example	DISP:EVM:VIEW:PRES RBSL
Instrument S/W Revision	A.01.60 or later

Figure 7-3 Preset View - RB Slot Meas



Preset View: Subcarrier Meas

This preset view consists of the following traces in a Grid 2x2 layout:

Error Vector Spectrum

IQ Meas (Log Mag)

Error Vector Time

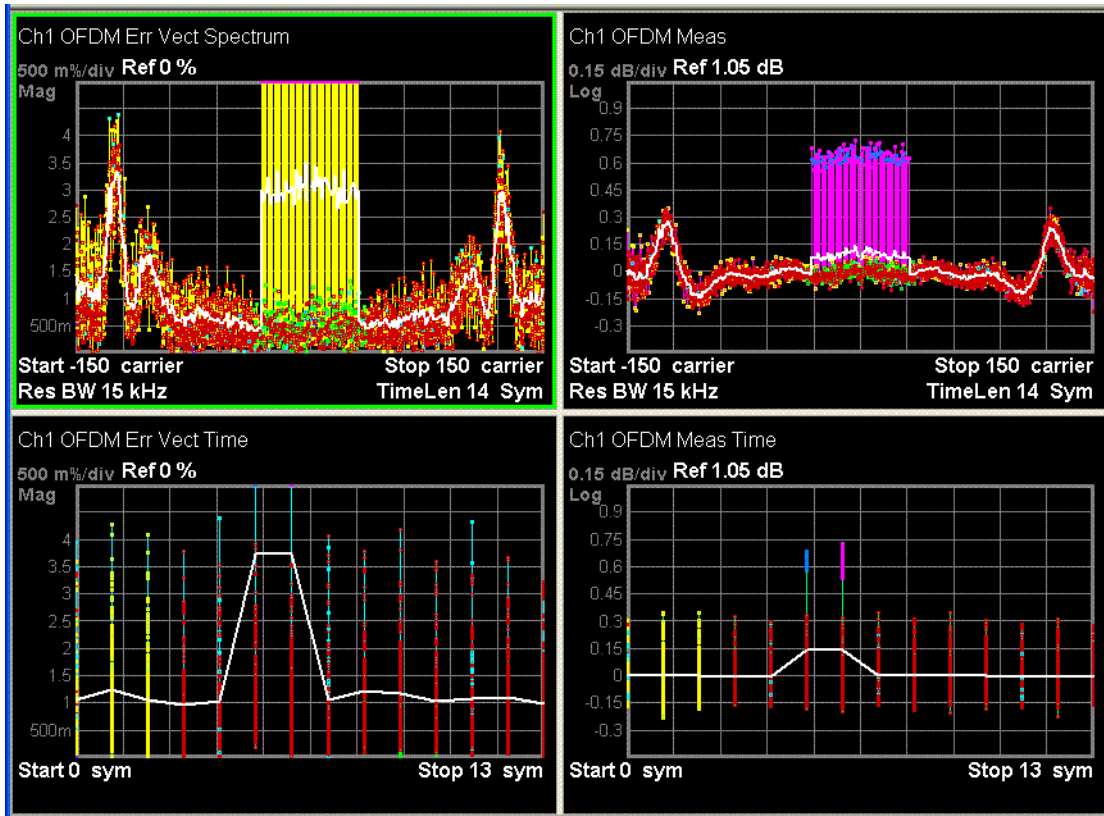
1. IQ Meas Time (Log Mag)

This layout provides the details on the Power and EVM results.

The Preset View: Subcarrier Meas softkey does an immediate action of changing the layout and view to this state. This Preset View is an action, not a state.

Key Path	View/Display, More
Mode	LTE
Remote Command	:DISPlay:EVM:VIEW:PRESet SUBCarrier
Example	DISP:EVM:VIEW:PRES SUBC
Instrument S/W Revision	A.01.60 or later

Figure 7-4 Preset View - Subcarrier Meas



Preset View: MIMO Summary

This preset view consists of the following traces in a Stacked layout:

MIMO Info Table

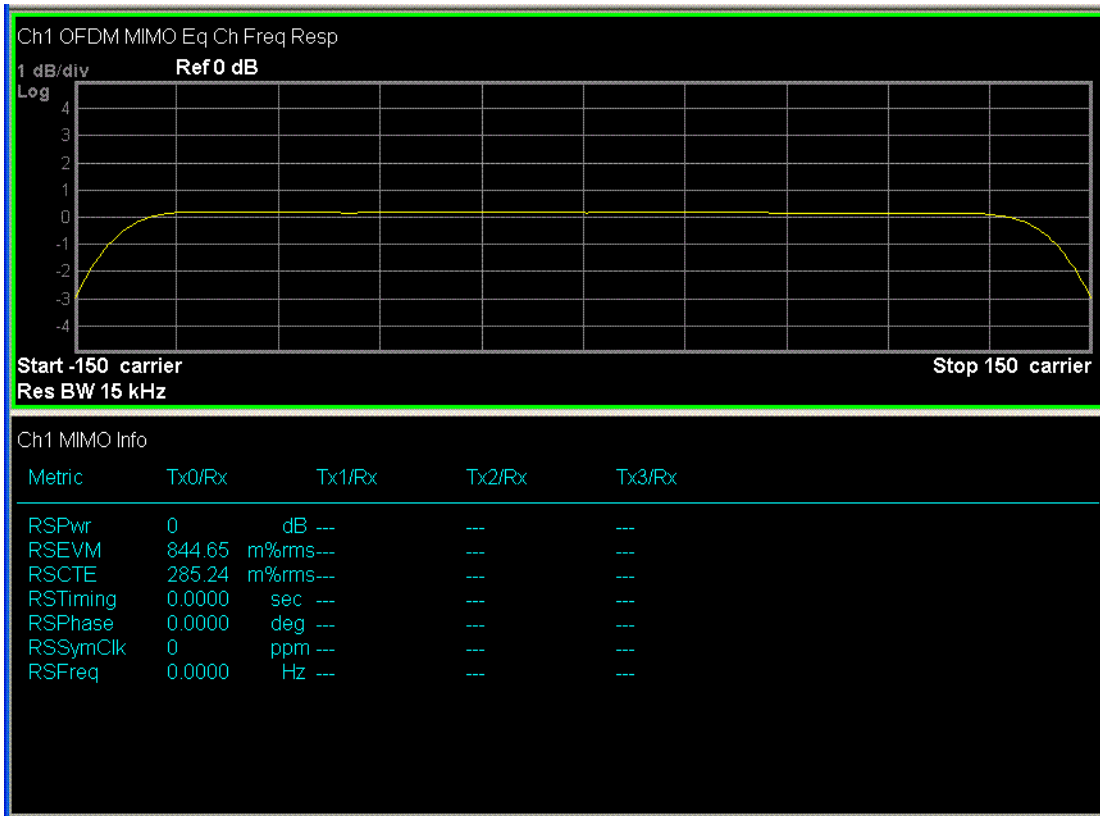
Chan Freq Resp

This layout provides the details on the MIMO results.

The Preset View: MIMO Summary softkey does an immediate action of changing the layout and view to this state. This Preset View is an action, not a state.

Key Path	View/Display, More
Mode	LTE
Remote Command	:DISPlay:EVM:VIEW:PRESet MIMO
Example	DISP:EVM:VIEW:PRES MIMO
Instrument S/W Revision	A.01.60 or later

Figure 7-5 Preset View - MIMO Summary



8

LTE - Additional Measurement Functions

The key and command descriptions in this section describe functions that operate the same in multiple measurements and/or modes. This section is a library of functions that is referenced by several measurements and modes

To find the exact description and parameters for functions in a specific measurement, always look in the measurement section of this documentation. Pressing the front-panel key or softkey and then pressing the green Help key also provides the correct information.

NOTE

If you want to print the documentation, be sure to select this section and the measurement of interest to ensure having all the information you need. See [“Printing Acrobat Files” on page 93](#) for further instructions about printing.

AMPTD Y Scale (Amplitude)

This menu has controls for the input signal conditioning as well as the Y-scaling of trace data. Input signal conditioning actually affect the input signal and the associated measurement quality, whereas Y-scaling is non-destructive of data. Even if the data is scaled so as to be clipped or completely off the display, the marker readouts are still correct and accurate data may still be retrieved via SCPI.

Key Path	Front Panel
Help Map ID	25884
Instrument S/W Revision	A.01.60 or later

Y Axis Scaling

Y axis scaling allows you to view the entire range of the data or zoom in on a range of interest. Scaling does not affect measurement setup, and rescaling can be done at any time on paused or complete measurements and the results of the rescaling are immediately visible. Y scaling can be made to track range setting for convenience in setting up measurements.

Key Path	AMPTD Y-Scale
Mode	VSA, LTE
Help Map ID	25885
Instrument S/W Revision	A.01.60 or later

Select Trace

This function is a duplicate of the same function found on the Trace/Detector menu. See the description there for details. It is placed here to allow you to conveniently choose which trace the Y scaling applies.

Key Path	AMPTD Y-Scale, Y Axis Scaling
Mode	VSA, LTE
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

Y Auto Scale

This immediate action key causes the Y reference value and Scale per Division to change so as to display the full trace without clipping.

Key Path	AMPTD/YScale
----------	---------------------

Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4:Y[:SCALE]:AUTO:ONCE
Example	:DISP:VECT:TRAC1:Y:AUTO:ONCE
Help Map ID	25762
Instrument S/W Revision	A.01.60 or later

Y Reference Value

This function controls the Y value of the selected trace at the Reference Position (see below). It has no effect on hardware input settings.

Key Path	AMPTD/YScale
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4:Y[:SCALE]:RLEVel <real> :DISPlay:<meas>:TRACe[1] 2 3 4:Y[:SCALE]:RLEVel?
Example	DISP:VECT:TRAC:Y:RLEV 20 DISP:VECT:TRAC:Y:RLEV?
Dependencies/Couplings	None. This does not affect any hardware input settings, like Range does.
Preset	Depends on trace
State Saved	Saved in instrument state.
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25758
Instrument S/W Revision	A.01.60 or later

Y Scale Per Division

This controls the Y scale per division of the selected trace.

Key Path	AMPTD/YScale
Mode	VSA, LTE

LTE - Additional Measurement Functions
AMPTD Y Scale (Amplitude)

Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4:Y[:SCALe]:PDIVision <real> :DISPlay:<meas>:TRACe[1] 2 3 4:Y[:SCALe]:PDIVision?
Example	DISP:VECT:TRAC:Y:PDIV 10 DISP:VECT:TRAC:Y:PDIV?
Dependencies/Couplings	None.
Preset	Depends on trace
State Saved	Saved in instrument state.
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25759
Instrument S/W Revision	A.01.60 or later

Couple Ref to Range

When Couple Ref to Range is on, a Y scaling is adjusted when the Range changes. For example, on traces with Y units of dBm, the reference value changes by the same amount in dB as the Range does. On a trace with Y units of Volts, the Per Division setting changes by a factor of approx. 1.25 when the Range changes by 2 dB. This function may be turned on or off on for each individual trace.

Key Path	AMPTD/YScale
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4:Y[:SCALe]:RLEVel:AUTO OFF ON 0 1 :DISPlay:<meas>:TRACe[1] 2 3 4:Y[:SCALe]:RLEVel:AUTO?
Example	DISP:VECT:TRAC1:Y:RLEV:AUTO ON DISP:VECT:TRAC1:Y:RLEV:AUTO?
Notes	Range coupling is not available for Phase and Group delay traces.
Preset	1
State Saved	Saved in instrument state.

Range	On Off
Help Map ID	25760
Instrument S/W Revision	A.01.60 or later

Y Reference: Position

This determines the position of the reference line for Y scaling for the selected trace. It may be set to the top, bottom, or center of the grid.

Key Path	AMPTD/YScale
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4:Y[:SCALE]:RPOSition TOP CENTer BOTTom :DISPlay:<meas>:TRACe[1] 2 3 4:Y[:SCALE]:RPOSition?
Example	DISP:VECT:TRAC1:Y:RPOS TOP DISP:VECT:TRAC1:Y:RPOS?
Dependencies/Couplings	Changing trace format or data can affect this. Each format "remembers" its reference position.
Preset	Depends on trace format and trace data. Top for LogMag or most LinearMag traces, middle for Real, Imaginary, Vector displays, Eye diagrams, Phase, Delay, Bottom for Linear Mag EVM
State Saved	Saved in instrument state.
Range	Top Ctr Bottom
Help Map ID	25761
Instrument S/W Revision	A.01.60 or later

Y Unit Preference

This determines the preferred Y unit for the selected trace. You can select Peak, RMS, Power units, or an automatic selection. The automatic selection is to show Power units for frequency domain data and Peak units for time domain data.

Key Path	AMPTD/YScale
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk

Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4 :Y:UNIT:PREFERENCE AUTO PEAK RMS POWer MRMS :DISPlay:<meas>:TRACe[1] 2 3 4 :Y:UNIT:PREFERENCE?
Example	DISP:VECT:TRAC1:Y:UNIT:PREF PEAK DISP:VECT:TRAC1:Y:UNIT:PREF?
Preset	AUTO
State Saved	Saved in instrument state.
Range	AUTO PEAK RMS POW MRMS
Help Map ID	25763
Instrument S/W Revision	A.01.60 or later

The following SCPI only command can be used to determine exactly which Y unit was chosen based on the setting of the above:

Key Path	AMPTD/YScale
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4 :Y:UNIT?
Example	DISP:VECT:TRAC1:Y:UNIT?
Help Map ID	25764
Instrument S/W Revision	A.01.60 or later

Y Log Ratio

This property is only used if the Trace Format is set to LogMag (Linear Unit). In this format type, you set the Y Log Ratio instead of Y Scale Per Division to determine Y scaling. It sets the ratio of the top of the Y axis to the bottom.

Key Path	AMPTD/YScale
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4 :Y:LRATio <real> :DISPlay:<meas>:TRACe[1] 2 3 4 :Y:LRATio?
Example	DISP:VECT:TRAC1:Y:LRAT 10000 DISP:VECT:TRAC1:Y:LRAT?
Notes	This is grayed out if the trace format is not Log Mag (linear unit).

Preset	100000
State Saved	Saved in instrument state.
Min	1.001
Max	100e6
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Yes
Help Map ID	25765
Instrument S/W Revision	A.01.60 or later

Vector Horiz Center

The Vector trace formats are I-Q and Constellation. When you are in one of these formats you set the vertical (imaginary) axis scaling with the Y Reference Value, Y Reference Position, and Y Scale Per Division properties. The scaling of the horizontal axis is set so as to maintain an aspect ratio of 1:1. The Vector Horiz Center property is used to set the position of the origin.

Key Path	AMPTD/YScale
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4:VHCenter <real> :DISPlay:<meas>:TRACe[1] 2 3 4:VHCenter?
Example	DISP:DDEM:TRAC1:VHC 0.2 DISP:DDEM:TRAC1:VHC?
Preset	0
State Saved	Saved in instrument state.
Min	-9.9e37
Max	9.9e37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25766
Instrument S/W Revision	A.01.60 or later

Copy Y Scale

This front-panel only function copies the following Y scaling information from the selected trace to another:

- Y reference Position
- Y Reference Value
- Y Unit Preference
- Vector Horiz Center
- Couple Ref to Range
- Y Log Ratio
- Y Reference Line
-

Key Path	AMPTD Y-Scale, Y Axis Scaling
Mode	VSA, LTE
Help Map ID	25886
Instrument S/W Revision	A.01.60 or later

Reference Line

This controls whether the Y reference line is visible or not.

Key Path	AMPTD/YScale
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4:RLINe OFF ON 0 1 :DISPlay:<meas>:TRACe[1] 2 3 4:RLINe?
Example	DISP:VECT:TRAC1:RLIN ON DISP:VECT:TRAC1:RLIN?
Preset	OFF
State Saved	Saved in instrument state.
Help Map ID	25767
Instrument S/W Revision	A.01.60 or later

Range

The Range setting represents the amplitude of the largest sinusoidal signal that could be present within the IF without being clipped by the ADC. For signals with high peak-to-rms ratios, the range may need to exceed the rms signal power by a fair amount to avoid

clipping.

Key Path	AMPTD/YScale
Mode	VSA, LTE
Remote Command	[:SENSe] :POWer [:RF] :RANGe <real> [:SENSe] :POWer [:RF] :RANGe?
Example	POW:RANG 25 POW:RANG?
Notes	The parameter is interpreted as dBm
Preset	20
State Saved	Saved in instrument state.
Min	depends on model and preamp options
Max	depends on model and preamp options
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25757
Instrument S/W Revision	A.01.60 or later

AUTO COUPLE

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement which have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key is meas local key, so its actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

For more information see Common Measurement Functions, [“AUTO COUPLE” on page 811](#)

Remote Command: :COUPle ALL|NONE

Example: :COUP ALL

Remote Command Notes: :COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the **Auto Couple** key).
 :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements.

Instrument S/W Revision: A.01.60 or later

BW (Bandwidth)

The BW key allows you to control the resolution bandwidth of the spectrum measurement result, as well as the shape of the resolution bandwidth filter (controlled by the FFT windowing function).

Key Path	Front Panel
Mode	VSA, LTE
Help Map ID	25888
Instrument S/W Revision	A.01.60 or later

Res BW

This key allows 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:

$$\text{Res BW} = \text{ENBW} / T$$

where:

ENBW is the normalized effective noise bandwidth of the Window (see the FFT Window topic 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 may be turned off. See the Res BW Coupling section for more details.

Limits:

The minimum Res Bw to Span ratio is related to the maximum Main Time length, and is given by:

$$\text{ENBW} / 409600 \text{ if Freq points state parameter is set to Auto}$$

$$\text{ENBW} / (\text{Freq Points} - 1) \text{ if Freq points parameter is manually set}$$

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:

$$\text{ENBW} / 12.5$$

$$(\text{ENBW} / 13.28125 \text{ for Flat Top window})$$

See the Main Time topic for more on relationships between Res BW and time.

Key Path	BW
Mode	VSA, LTE
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
Dependencies/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
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25790
Instrument S/W Revision	A.01.60 or later

Res BW Coupling

This property controls 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 will cause 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 time the Gate function on or manually set Main Time length.

If a requested change to Res BW or Time Length (Main or Gate) would cause the Res BW to go outside the minimum or maximum Res BW: Span limits (see the main Res BW section for specifics), the Res BW is clipped at the appropriate limit. The Time length is then set to according to the limited Res BW.

In Fixed coupling mode, if increasing the Span would cause 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 will 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 will 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, LTE
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
Dependencies/Couplings	See narrative above table and also Res BW section
Preset	SPAN
State Saved	Saved in instrument state.
Range	Span Min Fixed
Help Map ID	25791
Instrument S/W Revision	A.01.60 or later

FFT Window

This key allows you to choose the Window function that is applied to the time data prior to the FFT calculation used for Spectrum and PSD displays. Four windows are available.

Window name	Common usage	Normalized ENBW (Hz-s)
Uniform	Transient or self-windowing signals, signals that are periodic within a time record length.	1.0
Hanning	Frequency resolution	1.5
Gaussian	High dynamic range	2.21536
Flat Top	High amplitude accuracy	3.8194

The normalized ENBW is the equivalent noise bandwidth, that is, the width of a rectangular filter that passes the same amount of white noise as the window. It is used to define the resolution bandwidth.

Key Path	BW
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	[:SENSe] :<meas>:FFT:WINDow [:TYPE] UNIFORM HANNING GAUSSian FLATtop [:SENSe] :<meas>:FFT:WINDow [:TYPE] ?
Example	VECT:FFT:WIND GAUS VECT:FFT:WIND?
Dependencies/Couplings	See Res BW and Res BW Coupling sections
Preset	FLAT
State Saved	Saved in instrument state.
Range	Uniform Hanning Gaussian (High Dyn Rng) Flat Top (High Amptd Accy)
Help Map ID	25792
Instrument S/W Revision	A.01.60 or later

Cont (Continuous Measurement/Sweep)

Cont 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.

For more information see Common Measurement Functions, “[Cont \(Continuous Measurement/Sweep\)](#)” on page 813

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
Key Path:	Front-panel key
Instrument S/W Revision:	A.01.60 or later

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 Number** (in **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 Number** 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 Number 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 **Continuous** 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's 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.

FREQ Channel

Frequency parameters for any vector measurement consist of 2 pairs of properties: Center Frequency and Span or Start Frequency and Stop Frequency. These behave much as they do in any other application, but there is the additional constraint that the span is limited to much less than the center frequency range.

If you change center frequency the start and stop frequencies change by the same amount.

If you change span, start frequency and stop frequency are changed by 1/2 the span change.

If you change start frequency, stop frequency remains fixed and span and center frequency are refigured accordingly. Changing stop frequency has similar behavior.

Limits:

If you change the start frequency such that it will equal or exceed the stop frequency, the new start frequency will be accepted if possible and the stop frequency will be set to min span above the start. Similarly if you attempt to set the stop below the start, the start frequency will move to a min span below the new stop frequency.

If you reduce the start frequency beyond a max span below the stop, the stop frequency will be "dragged along" such that it will be a max span above the new start frequency, and similarly increasing the stop frequency will drag the start frequency along if you attempt to increase the span beyond the maximum.

Stop frequency may be 1/2 span above the maximum center frequency, but frequency-domain traces are blanked above the maximum center frequency.

Start frequency may be 1/2 span below the minimum center frequency, but frequency-domain traces are blanked below the minimum center frequency.

Pressing the Freq hardkey changes the active function to Center Frequency.

Key Path	Front Panel
Mode	VSA, LTE
Help Map ID	25889
Instrument S/W Revision	A.01.60 or later

Center Freq

Sets the frequency of the display Center.

Key Path	FREQ Channel
Mode	VSA, LTE

Remote Command	[:SENSE] :FREQuency:CENTer <freq> [:SENSE] :FREQuency:CENTer?
Example	FREQ:CENT 985 MHZ FREQ:CENT?
Dependencies/Couplings	Start Freq, Stop Freq, and Span. See narrative under FREQ Channel heading for details.
Preset	1 GHz
State Saved	Saved in instrument state.
Min	0 Hz
Max	Depends on frequency range option.
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25793
Instrument S/W Revision	A.01.60 or later

Start Freq

Sets the frequency of the display Start.

Key Path	FREQ Channel
Mode	VSA, LTE
Remote Command	[:SENSE] :FREQuency:STARt <freq> [:SENSE] :FREQuency:STARt?
Example	FREQ:STAR 980 MHz FREQ:STAR?
Dependencies/Couplings	Stop Freq, Center Freq, and Span. See narrative under FREQ Channel heading for details.
Preset	Depends on span option. It is 1/2 max span below 1 GHz
State Saved	Saved in instrument state.
Min	-9.9e37
Max	9.9e37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25794
Instrument S/W Revision	A.01.60 or later

Stop Freq

Sets the frequency of the display Stop.

Key Path	FREQ Channel
Mode	VSA, LTE
Remote Command	[:SENSe] :FREQuency:STOP <freq> [:SENSe] :FREQuency:STOP?
Example	FREQ:STOP 990 MHz FREQ:STOP?
Dependencies/Couplings	Start Freq, Center Freq, and Span. See narrative under FREQ Channel heading for details.
Preset	Depends on span option. It is 1/2 max span above 1 GHz
State Saved	Saved in instrument state.
Min	-9.9e37
Max	9.9e37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25795
Instrument S/W Revision	A.01.60 or later

CF Step

This key controls the amount the center frequency changes if it is the active function and the user presses the Up or Down arrow key. Note: the start and stop frequency also change by the amount of the CF Step if the Up/Down arrow keys are used to change them; but the key is mainly used in connection with stepping the center frequency, so the legacy key name has been retained. The step size in Auto mode is 1/10th the span. It can be set to any value in manual mode.

Key Path	FREQ Channel
Mode	VSA, LTE
Remote Command	[:SENSe] :FREQuency:CENTer:STEP[:INCRement] <freq> [:SENSe] :FREQuency:CENTer:STEP[:INCRement] ? [:SENSe] :FREQuency:CENTer:STEP:AUTO OFF ON 0 1 [:SENSe] :FREQuency:CENTer:STEP:AUTO?

Example	FREQ:CENT:STEP 1 MHZ FREQ:CENT:STEP? FREQ:CENT:STEP:AUTO ON FREQ:CENT:STEP:AUTO?
Dependencies/Couplings	1/10th Span when auto is turned on
Preset	Depends on span option; 1/10th default span.
State Saved	Saved in instrument state.
Min	-9.9e37
Max	9.9e37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25796
Instrument S/W Revision	A.01.60 or later

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.

Other functions related to the input/output connections can be found under **Trig** (trigger input controls) and **System** (LAN and other I/O bus configurations) and **Amplitude** (optional internal preamp).

The functions in the Input/Output menu are common to all Modes (applications). They are “global”. But individual functions are only available in a mode if they make sense. They will be grayed out (as opposed to not showing them at all). This is a special behavior of the Input/Output Menu, which is the only menu that is common across all applications.

For more information see Common Measurement Functions, [“Input/Output” on page 815](#)

Remote Command:	[:SENSE] :FEED RF AIQ IQ IONLY QONLY INDEPENDENT AREFERENCE [:SENSE] :FEED?
Preset:	This setting is unaffected by a Preset or power cycle. It survives 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 state
Instrument S/W Revision:	A.01.60 or later

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 Preset and 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.

Marker

The Marker hardkey displays the Marker menu. A marker can be placed on a trace to allow the value of the trace data at the marker position to be determined precisely. Markers can also be used in pairs to read the difference (or delta) between two data points. They can also be used to make power calculations over a band of frequencies or a time interval. See Marker Functions below for more details.

The functions in this menu include a 1-of-N selection of the control mode Normal, Delta, Fixed, or Off for the selected marker. The control mode is described below.

Pressing Marker always makes the selected maker's X position the active function.

If the currently selected marker is Off, pressing Marker sets it to Normal mode and places it at the center of the screen on the currently selected trace.

As a convenience, if there are no markers displayed on the current trace, pressing the marker hardkey (whenever the marker menu is already showing) selects the lowest numbered marker that is currently off and turns it on in normal mode on the selected trace. In other words, pressing the Marker hardkey twice will always turn on a marker on the selected trace if none was turned on before.

For more information see the Monitor Spectrum - Additional Measurement Functions “Marker” on page 707 for a description of this function.

Key Path	Front Panel
Mode	VSA, LTE
Help Map ID	25859
Instrument S/W Revision	A.01.60 or later

Select Marker

Specifies the selected marker. The selected marker is the one that is affected by the marker position and properties settings, peak search, and other marker functions. Several menus have a Select Marker key for convenience. Marker selection using any one of these is reflected in all others, i.e., there is only one selected marker for the whole measurement. If all markers are off, then marker 1 becomes the selected marker.

As a convenience, if no markers are displayed on the selected trace, selecting a marker that is off automatically turns it on in normal mode on the selected trace.

There is no SCPI function for selecting a marker. Instead, SCPI functions may explicitly include the index of the marker for which they are to apply. (Most SCPI marker functions that affect the state of a marker will also make it the selected marker for front panel commands.)

Key Path	Marker or Marker> or Marker Function
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Mode	VSA, LTE
State Saved	No
Range	1 2 3 4 5 6 7 8 9 10 11 12
Help Map ID	25724
Instrument S/W Revision	A.01.60 or later

Control Mode

The control mode of the selected marker is selected by pressing **Normal**, **Delta**, **Fixed**, or **Off**. The behavior of a marker under each control mode is described below the table. The current control mode is shown by highlighting the appropriate key.

The SCPI command in the table below selects the marker and sets the marker control mode as described under Normal, Delta, Fixed and Off, below. All interactions and dependencies detailed under the key description are enforced when the remote command is sent.

Key Path	Marker
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MO DE POSITION DELTa FIXed =OFF :CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MO DE?
Example	CALC:VECT:MARK1:MODE POS CALC:VECT:MARK1:MODE?
Dependencies/Couplings	When Delta mode is selected, or when the mode is changed from Delta to Off, the marker relative to the selected marker may be affected, as described in the text descriptions below.
Preset	=OFF
State Saved	Saved in instrument state.
Range	Normal Delta Fixed Off
Help Map ID	25725
Instrument S/W Revision	A.01.60 or later

Normal (Position)

A marker in normal mode reports the trace data value (Y value) at a particular point on a trace. The marker's absolute X (and Z) position is specified by you in displayed units. The marker symbol appears on the trace at the specified position and tracks the absolute Y

value at that position as it changes from scan to scan. The absolute Y value is displayed in the marker readout area. In older instruments this was called Position mode, and the designation may still be used for backward compatibility.

For Control Mode SCPI command information see: Control Mode

Key Path	Marker
Mode	VSA, LTE
Help Map ID	25860
Instrument S/W Revision	A.01.60 or later

Delta

A marker set to delta mode reports the difference between Y values at two points. A delta marker is relative to an associated reference marker on the same trace. (The reference marker may be set on the Marker, Properties, Relative To menu). The reference marker is usually fixed, but may also be normal or delta. The X (and Z) position of a delta marker is specified as an offset from the reference marker position. The delta marker symbol tracks the absolute Y value just like a normal marker, but the marker readout displays the difference between the absolute Y values of the delta marker and its reference marker (absolute units are used even if the reference is itself a delta marker). Usually this is a straight difference in the current displayed units. For example, if the trace format is LogMag (dBm), the delta marker displays the difference in dB, thus showing a power ratio. But if the trace format is Real, then the delta marker shows a voltage difference, not a ratio. Exceptions for this are:

- When the trace format is Linear Mag or Log Mag (linear unit) the delta marker displays a voltage ratio, or (if the Y Axis unit is Power) a power ratio, rather than a difference.
- When either the marker or its reference has a marker function turned on, the delta marker always displays a ratio or its decibel equivalent. See Marker Function for more details on how delta markers work with marker functions. The type of ratio calculated (power or voltage) depends on the delta marker units; the reference marker value is converted as needed so it has compatible units.
- When the trace format is Wrap Phase, the delta marker readout is constrained to the wrapped phase display range, which is usually $(-180, +180]$ degrees. For example, if the absolute phase at marker 1 is 170 deg and its reference has phase of -170 deg, the delta will not show 340 deg, but -20 deg. Note that the Wrap Phase display range can be changed (see Trace/Detector, Phase/Delay Properties, Phase/Trellis Offset).

There is no current support for calculating deltas across traces (and this cannot be done at all unless the traces have the same domain and ranges).

By default, the reference marker for marker 1 is marker 2; for marker 2 is 3 and so on, but the reference marker may be changed. See the section on the "Relative To" softkey below.

The following coupling rules apply from the front panel, and also if the equivalent SCPI commands are sent.

Pressing the Delta key causes the selected marker becomes a delta marker if it is not

already. Also, the selected marker's reference is affected as follows:

- If the reference marker was off, it is turned on as a fixed marker.
- The reference marker is moved to the trace of the selected marker and set to the same position as the selected marker.
- If the delta marker has a marker function turned on, the reference marker takes on the same function (with the same band limits).

Exception: Pressing Delta when the selected marker's mode is not yet Delta does not move or change a reference marker that is already turned on (Normal, Delta, or Fixed) and on the same trace as the selected marker. It merely changes the selected marker's mode to Delta and shows the current offset between it and the reference. If you press Delta again (when the selected marker is already in Delta mode) then the reference is moved and modified as described above.

When a delta marker is changed to any other control mode, if its reference marker is fixed then the reference marker is also turned off.

If you move a delta marker to a different trace, it is forced to Normal mode, and if its reference is fixed, the reference is turned off.

A delta marker is forced to Normal mode if you turn its reference off, or if you move its reference to another trace. (In the latter case the reference is not turned off even if it is fixed.)

If you change the selected marker's reference (using the Marker, Properties, Relative To) the selected marker is forced to Delta mode. This change of the selected marker to Delta mode causes its new reference's control mode and position to change as described above.

For Control Mode SCPI command information see: [Control Mode](#)

Key Path	Marker
Mode	VSA, LTE
Help Map ID	25861
Instrument S/W Revision	A.01.60 or later

Fixed

Fixed markers are mainly used as reference markers for Delta markers. A fixed marker's X and Y Axis values may be directly or indirectly specified by you, and they remain fixed once specified, i.e. they do not follow the trace data value. These markers are represented on the display by an "X" rather than a diamond. If a marker is changed from off to fixed, the X and Y (and Z) values are chosen to put it in the center of the display. If the marker is changed from some other type to fixed, the current X and Z values of the marker remain unchanged. The Y value is taken from the current trace data value and must be changed manually thereafter.

For Control Mode SCPI command information see: Control Mode

Key Path	Marker
Mode	VSA, LTE
Help Map ID	25862
Instrument S/W Revision	A.01.60 or later

Off

Turning a marker off makes it invisible, and also its annotation.

Turning a marker on (i.e. changing its control mode from Off to any other control mode) assigns the marker to the currently selected trace.

For Control Mode SCPI command information see: Control Mode

Key Path	Marker
Mode	VSA, LTE
Help Map ID	25863
Instrument S/W Revision	A.01.60 or later

Marker Position

Marker position is used to select which data point in a trace we want to read out with the marker (or where to locate a fixed marker). The marker position is primarily set in terms of the domain units, not trace points (although it can be set in terms of points via SCPI). The default active function when you press a marker hard key is the X position for the currently selected marker. The exception to this is when the selected marker is fixed. In that case there is no default active function (to prevent inadvertently changing a fixed marker's location).

Marker position is not defined when a marker's control mode is Off. When a marker is turned on in Normal or Delta mode, its X (and Z) values are set to the center of the trace data. If a marker is turned on in Fixed mode, its position is set so that it appears in the middle of the trace grid.

The Marker Position key branches to the Marker Position menu, which allows you to set any position variable relevant to the selected marker's control mode and trace format.

For Normal and Delta markers, usually only Marker X is available. Marker Z is available for trace data with 2-dimensional domain. For Fixed markers, Y may also be set. If the trace format is Vector or Constellation, Marker Y controls the real (horizontal axis) value and Marker Y Imag controls the imaginary (vertical axis) value. The key (or the keys below it) is grayed out if the selected marker is off.

Key Path	Marker
Mode	VSA, LTE

Help Map ID 25726
Instrument S/W Revision A.01.60 or later

Marker X

This sets the selected marker's X Axis value position in the current X Axis Scale unit. If the control mode is Off, the SCPI command has no effect other than to cause the marker to become selected. Note that the X value may change if the marker is moved to a trace with a different domain.

The Marker X position is absolute if the marker control mode is Normal or Fixed. If the control mode is Delta, then the X position is relative to the reference marker. The valid X positions are the actual data points in the trace; the marker cannot be located between points. If a SCPI command attempts to place the marker between two points, the X value snaps to the closest point.

Note that for Vector or Constellation format, the X axis is perpendicular to the screen (because the screen axes are used to show the real and imaginary parts of the Y value), so adjusting the X value in this case will only cause the marker to move horizontally if the real Y value changes. For Fixed markers on a trace with one of these formats, adjusting the X value will not cause horizontal motion of the marker at all. Instead, you use the Marker Y and Marker Y (imag) controls to move the marker horizontally and vertically.

Key Path	Marker, Marker Position
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :X <real> :CALCulate:<meas>:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :X?
Example	CALC:VECT:MARK:X 0.325 CALC:VECT:MARK:X?
Notes	Marker X will not go outside the bounds of the data unless it is Fixed. If you attempt to set it to a value outside the bounds it will be clipped at the closest limit, and error -222 Data Out of Range is generated. If suffix is sent, it must match the X units for the trace the marker is on. Otherwise, error -138, "Suffix not allowed" is generated. If you try to read or set the position of a Delta marker, remember that the position is in relative units.
Dependencies/Couplings	See Coupling at the end of the Control Mode section. See also Couple Markers section.
Preset	None until marker is turned on.
State Saved	Saved in instrument state.

Min	Depends on trace data
Max	Depends on trace data
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25727
Instrument S/W Revision	A.01.60 or later

SCPI only X position commands

Via SCPI , the marker position may also be set or queried in trace points. In this case, the position setting or reading is absolute regardless of control mode.

NOTE: The entered value in Trace Points is immediately translated into the current domain units for setting the value of the marker. The marker's value in domain units, NOT trace points, will be preserved if a change is made to the X Axis scale settings. Thus, if you use this command to place a marker on point 500, which happens at that time to correspond to 13 GHz, and then you change the Start Frequency so that point 500 is no longer 13 GHz, the marker will stay at 13 GHz, NOT at point 500.

If the trace the marker is on has a 2-dimensional domain, then the points are numbered in the following way:

Starting at the minimum X and Z position, this point is numbered 0. Each time you increment the point number, increment the X value to the next available value. When X reaches the maximum X position, then reset X to the minimum and increment the Z value. Then continue incrementing the X position in the same manner as before.

Note that for symbol tables, which have no axes, incrementing the X position in points moves the marker consecutively through all table entries.

Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 [:X]:POSition <real> :CALCulate:<meas>:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 [:X]:POSition?
Example	CALC:VECT:MARK:POS 25 CALC:VECT:MARK:POS?
Notes	When a marker control mode is changed from off to any other mode, the X position is set to mid-screen.
Dependencies/Couplings	Same couplings as for Marker X value
Preset	None until marker is turned on.

State Saved	Saved in instrument state.
Min	Depends on trace data
Max	Depends on trace data
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

Marker X Unit may be queried via SCPI

Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :X: UNIT?
Example	CALC:VECT:MARK:X:UNIT?
Notes	Query Only
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

Marker Y

This function only affects fixed markers. It allows you to set or read back the selected marker's Y Axis value in the current Y Axis Scale unit. Setting the Y value has no effect (other than to cause the marker to become selected) if the control mode is other than fixed. The query form generates an error if the control mode is Off. Note that the Y value may change if the Y-axis units change, either from a change in format of the trace the marker is on, or if the marker is moved to a different trace.

If the selected marker is on a trace that is displayed with Vector or Constellation format, this function controls only the real part of the Y value (i.e., the horizontal axis value). Use the Marker Y (imag) control to change the imaginary (vertical) value. Marker Y and Marker Y Imag always set or get the rectangular form of Y, regardless of whether the marker readout is polar or rectangular.

Key Path	Marker, Marker Position
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk

Remote Command	:CALCulate:<meas>:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :Y [:REAL] <real> :CALCulate:<meas>:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :Y [:REAL] ?
Example	CALC:VECT:MARK2:Y 0.325 CALC:VECT:MARK2:Y?
Notes	You cannot set Y unless the marker type is fixed. If the marker becomes fixed after a marker function is turned on, it is set to whatever the Y value was when the marker became fixed. If suffix is sent, it must match the Y units for the trace the marker is on. Otherwise, error -138, "Suffix not allowed" is generated.
Dependencies/Couplings	Changes if marker is relative to a Delta marker that is turned on or re-zeroed (see Coupling of Delta and Reference Markers).
Preset	None until marker is turned on.
State Saved	Saved in instrument state.
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25728
Instrument S/W Revision	A.01.60 or later

Marker Y Unit may be queried via SCPI.

Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :Y :UNIT?
Example	CALC:VECT:MARK:Y:UNIT?
Notes	Query Only
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

Marker Y Imag (Imaginary)

This only affects fixed markers and is only available when the trace format is Vector or Constellation. It allows you to set or read back the selected marker's quadrature (imaginary) Y value in the current Y Axis Scale unit. It has no effect (other than to cause

the marker to become selected) if the control mode is other than fixed, or if the current trace format is not complex. The query form generates an error if it is used for a marker that is not on a complex trace. Marker Y Imag is not affected by whether the marker readout is polar or rectangular.

Key Path	Marker, Marker Position
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :Y: IMAGinary <real> :CALCulate:<meas>:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :Y: IMAGinary?
Example	CALC:DDEM:MARK1:Y:IMAG 0.435 CALC:DDEM:MARK1:Y:IMAG?
Notes	Grayed out unless the marker is fixed and on a vector display. If suffix is sent, it must match the Y units for the trace the marker is on. Otherwise, an Invalid Suffix error is generated. Otherwise, error -138, "Suffix not allowed" is generated. If query is sent while the marker is on a trace whose format is not vector or constellation, NaN (9.91E+37) is returned.
Preset	None until marker is turned on.
State Saved	Saved in instrument state.
Min	Depends on trace format
Max	Depends on trace format
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25729
Instrument S/W Revision	A.01.60 or later

Marker Z

For markers on traces with a 2-dimensional domain, this sets the selected markers Z Axis value in the current Z Axis Scale unit. In each case the marker that is addressed becomes the selected marker. It has no effect (other than to cause the marker to become selected) if the control mode is **Off**, or if the trace has no Z domain. Note that the Z value may change or become irrelevant if the marker is moved to a trace with a different Z domain, or no Z domain.

Note that this Z value is affected if the SCPI command to set marker point position is used.

Key Path	Marker, Marker Position
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 : Z <real> :CALCulate:<meas>:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 : Z?
Example	CALC:OFDM:MARK:Z 12 CALC:OFDM:MARK:Z?
Notes	Marker Z will not go outside the bounds of the data unless it is Fixed. If you attempt to set it to a value outside the bounds it will be clipped at the closest limit, and error -222 Data Out of Range is generated. If suffix is sent, it must match the Z units for the trace the marker is on. Otherwise, error -138, "Suffix not allowed" is generated.
Dependencies/Couplings	See Coupling at the end of the Control Mode section. See also Couple Markers section.
Preset	None until marker is turned on.
State Saved	Saved in instrument state.
Min	Depends on trace data
Max	Depends on trace data
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25730
Instrument S/W Revision	A.01.60 or later

Marker Z Unit may be queried via SCPI.

Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 : Z: UNIT?
Example	CALC:OFDM:MARK:Z:UNIT?
Notes	Query Only

Help Map ID	0
Instrument S/W Revision	A.01.60 or later

Marker Properties

The Marker Properties key accesses a menu of common marker properties.

Key Path	Marker
Mode	VSA, LTE
Help Map ID	25864
Instrument S/W Revision	A.01.60 or later

Relative To

This key allows you to specify which marker is used as a reference for the selected marker when the selected marker's control mode is set to Delta. By default, the reference marker is numerically one higher than the selected marker, that is, marker 1 is relative to marker 2, marker 2 to marker 3, and so on. Marker 12 by default is relative to marker 1. This key allows you to change the reference marker from the default. Note that a marker cannot be made relative to itself.

Key Path	Marker, Properties
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :RE FERENCE <integer> :CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :RE FERENCE?
Example	CALC:VECT:MARK2:REF 4 CALC:VECT:MARK2:REF?
Notes	The reference marker cannot be the same value as the selected marker, i.e., a marker cannot be relative to itself. The currently selected marker will not be an available choice in the relative to selection (i.e. the selected marker will appear grayed out). When queried a single value will be returned (the specified marker numbers relative marker).
Dependencies/Couplings	See Coupling of Delta and Reference Markers above. The old reference remains as it was.
Preset	2 3 4 5 6 7 8 9 10 11 12 1
State Saved	Saved in instrument state.

Range	1 2 3 4 5 6 7 8 9 10 11 12
Help Map ID	25732
Instrument S/W Revision	A.01.60 or later

Complex Format

This determines the format for the readout when a marker is placed on a complex display (vector or constellation). The choices are to read out in rectangular or polar coordinates. The readout format applies to the marker display and marker table only; there is no SCPI for reading out the marker value in polar form.

Key Path	Marker, Properties
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:CF ORmat RECTangular POLar :CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:CF ORmat?
Example	CALC:VECT:MARK1:CFOR RECT CALC:VECT:MARK1:CFOR?
Preset	RECT
State Saved	Saved in instrument state.
Range	Rect Polar
Help Map ID	25733
Instrument S/W Revision	A.01.60 or later

Marker Trace

This key allows you to determine the trace to which a marker is assigned. By default, when a marker is turned on it is assigned to the currently selected trace. You may change that assignment using this control.

Key Path	Marker, Properties
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk

Remote Command	:CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:TRACe <integer> :CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:TRACe?
Example	CALC:VECT:MARK3:TRAC 2 CALC:VECT:MARK3:TRAC?
Dependencies/Couplings	See Couplings of Delta and Reference Markers above..
Preset	Marker is assigned to currently selected trace when turned on.
State Saved	Saved in instrument state.
Range	Trace 1 Trace2 Trace 3 Trace 4
Min	1
Max	4
Test MIN/MAX/DEF	Yes
Help Map ID	25734
Instrument S/W Revision	A.01.60 or later

Marker Count

This key enables the frequency counter algorithm on the selected marker. This algorithm can more precisely determine the frequency of a peak. The marker must be on a frequency domain trace, with data coming from hardware. Place the marker on a peak and enable the frequency counter. The marker readout then shows the calculated frequency rather than the marker X position. Only one marker can be counted at any time. Turning on marker count for any marker turns it off for all other markers.

Key Path	Marker, Properties
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:FCOut[:STATE] OFF ON 0 1 :CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:FCOut[:STATE]?
Example	CALC:VECT:MARK:FCO ON CALC:VECT:MARK:FCO?
Notes	Marker must be on a frequency-domain trace and data must be live, not recorded or simulated.
Preset	OFF

State Saved	Saved in instrument state.
Range	Off On
Help Map ID	25735
Instrument S/W Revision	A.01.60 or later

The frequency counter result must be read back with the following SCPI command. The Marker X query command will only get the marker's data point position, which will not be as accurate as the frequency counter result.

Key Path	SCPI only
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :FC Ount :X?
Example	CALC:VECT:MARK:FCO:X?
Notes	Query only. If the marker counter result is unavailable, NaN is returned.
Help Map ID	25736
Instrument S/W Revision	A.01.60 or later

Marker Table

When the Marker Table is turned on, the display is split into a measurement window and a marker data display window. For each marker which is on, information is displayed in the data display window, which includes the marker number, control mode, trace number, X axis scale, X axis value, and the Y-axis result. Additional information is shown for markers which have marker functions turned on.

Key Path	Marker
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer:TABLE [:STATE] OFF ON 0 1 :CALCulate:<meas>:MARKer:TABLE [:STATE] ?
Example	CALC:VECT:MARK:TABL ON CALC:VECT:MARK:TABL?
Preset	OFF

State Saved	No
Range	Off On
Help Map ID	25737
Instrument S/W Revision	A.01.60 or later

Couple Markers

Marker Coupling affects all currently displayed markers. In general when coupling is turned on then all Normal or Delta markers with the same (or equivalent) domain as the selected marker move in the same manner as the selected marker. Coupling is relative between markers on the same trace (so that their relative positions in the domain are maintained). Coupling can be absolute between markers on different traces that have equivalent domains. That is, they are forced have the same position in the domain, if possible. (As an example of equivalent domains, demodulated symbol positions can be derived from time by using the current symbol rate). When you move the selected marker, then others on related traces track it. This is to allow you to correlate different measurement results. For example, to you can place a marker at a particular symbol time on an error vector magnitude display, and have tracking markers on the symbol table and pre-demod time trace, showing you the symbol value and the actual time-varying signal value at the same point in time.

Absolute coupling is performed only for the lowest numbered Normal or Delta marker on each trace. All other markers on a trace couple relatively. When you turn on marker coupling, the subset of markers that have the same domain as the selected marker track it and all other markers remain at their current location. The absolutely coupled markers within this subset will be moved at this time to match the domain setting of the selected marker, with the relatively coupled markers following accordingly to maintain offsets within their respective traces. Those markers with different domains remain at their current location. When you select a marker with a different domain than the previously selected marker, then the subset of markers with that domain go through the same procedure.

Any marker that coupling would move outside its range of X values, will remain at the closest limiting value until the selected marker moves in such a way as to bring the coupled X value back into range. If the coupled markers are on data that do not have the same domain resolution, then they are positioned as close to each other as possible.

If markers change mode or trace, or trace data is changed below them, the coupling rules are immediately applied to the new set.

Key Path	Marker
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer:COUple[:STATe] OFF ON 0 1 :CALCulate:<meas>:MARKer:COUple[:STATe]?

Example	CALC:VECT:MARK:COUP ON CALC:VECT:MARK:COUP?
Preset	OFF
State Saved	Saved in instrument state.
Range	Off On
Help Map ID	25738
Instrument S/W Revision	A.01.60 or later

All Markers Off

This function turns all markers off and sets the selected marker to 1.

Key Path	Marker
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer:AOFF
Example	CALC:VECT:MARK:AOFF:
Help Map ID	25739
Instrument S/W Revision	A.01.60 or later

Marker Function

This key accesses a menu of selectable marker functions for VSA based measurements.

Marker Functions perform post-processing operations on marker data. Band Functions are Marker Functions that allow you to define a band of frequencies around the marker. The band defines the region of data used for the numerical calculations. These marker functions also allow you to perform mathematical calculations on trace and marker data and report the results of these calculations in place of the normal marker result.

Unlike regular markers, marker function markers are not placed directly on the trace. They are placed at a location which is relative to the result of the function calculation.

The Marker Function menu gives you access to power calculations in bands of frequencies or time intervals centered on a marker. It also allows you to make calculations like carrier to noise by combining delta markers with marker functions. Marker functions are generally available for time and frequency domain traces, and not for others. If the marker function calculation is undefined for particular trace data, then "---" is shown in place of a number in the result display and marker table, and CALC:<meas>:MARK[n]:Y? will return 9.91E+37 (NaN).

Pressing Marker Function always makes the selected marker's X position the active function.

If the selected marker is off, pressing the Marker Function hardkey turns on the selected marker in normal mode on the currently selected trace.

Key Path	Marker Function
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :FU Nction BPOWer BDENSity =OFF :CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :FU Nction?
Example	CALC:VECT:MARK1:FUNC BPOW CALC:VECT:MARK1:FUNC?
Notes	:CALC:<meas>:MARK1:FUNC? returns the current function type for marker 1. To return the result, use :CALC:<meas>:MARK1:Y?
Preset	=OFF
State Saved	Saved in instrument state.
Range	Band Power Band Density Off
Help Map ID	25877

Instrument S/W Revision A.01.60 or later

Band/Interval Power

Turns on the Band/Interval Power function for the selected marker. This function calculates the power within the band centered on the marker. The function works generally with frequency spectra, PSD and time traces. On traces where band power is undefined, the result display shows "---" and CALC:<meas>:MARK[n]:Y? will return 9.91E+37 (NaN), although the band interval can still be defined.

Frequency-domain data

If the marker is on a frequency-domain trace, the result is total power within the band. This is true whether the underlying trace data is a power spectrum or power spectral density.

Time-domain data

If the marker is on a time-domain trace, the result is average power within the time interval, that is, the power at each time sample in the time interval is calculated, the powers are summed and the total divided by the number of samples.

Key Path	Marker Function
Mode	VSA, LTE
Help Map ID	25878
Instrument S/W Revision	A.01.60 or later

Band Power Calculation

A band/interval power calculation result may be shown in dBm, dBVrms, Watts, Volts RMS Squared or Volts RMS. The table below shows the choice of display units if Band Power Calculation is set to Mean, depending on the current format and Y units of the trace the marker is on.

Trace data type	Trace Format	Y Unit	Result format
-----------------	--------------	--------	---------------

Spectrum, PSD, Time record	LogMag (dB)	Auto, Power	dBm
		Peak, RMS	dBVrms
		mRMS	dBmVrms
	Linear Mag, Real, Imag, Log Mag (lin)	Auto, Peak, RMS, mRMS	Vrms^2
	Linear Mag, Real, Imag, Log Mag(lin)	Power	W
	Wrap Phase, Unwrap Phase, Delay	Any	Vrms^2
	Vector, Constellation, Eye, Trellis	Any	blanked
Dimensionless (e.g., Frequency response, Impulse response, various Demodulation error types)	LogMag (dB)	Any	dBrms
	Linear Mag, Real, Imag, Wrap Phase, Unwrap Phase, Delay, Log Mag (lin)	Any	rms^2
General dimensions(e.g., Hz, %)	LogMag (dB)	Any	dB<unit>rms
	Linear Mag, Real, Imag, Wrap Phase, Unwrap Phase, Delay, Log Mag (lin)	Any	<unit>rms^2

If the Band Power Calculation is set to RMS, then the readout unit does not depend on trace format or Y unit. For Spectrums, PS and Time record traces the displayed unit is "Vrms" For general units, the unit abbreviation is shown followed by "rms".

The Band Power Calculation only controls the readout format for Normal and Fixed markers. For Delta markers, see the discussion below.

Key Path	Marker Function, Band/Interval Power
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :FUNction:BPOWER:CTYPe MEAN RMS :CALCulate:<meas>:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :FUNction:BPOWER:CTYPe?
Example	CALC:VECT:MARK1:FUNC:BPOW:CTYP MEAN CALC:VECT:MARK1:FUNC:BPOW:CTYP?
Preset	MEAN

State Saved	Saved in instrument state.
Range	Mean RMS
Help Map ID	25748
Instrument S/W Revision	A.01.60 or later

Band/Interval Density

This function calculates the average power density within the band centered on the marker. The function works generally with frequency spectra, PSD and time traces. On traces where band power cannot reasonably be defined, the result display shows "---" and CALC:<meas>:MARK[n]:Y? returns NaN (9.91E+37), although the band interval can still be defined.

Frequency-domain data

If the marker is on a frequency-domain trace, the result is the band power (as computed above) divided by the bandwidth over which it is measured. This is true whether the underlying trace data is a power spectrum or power spectral density.

Time-domain data

If the marker is on a time-domain trace, the result is average power within the time interval (as computed above) divided by the equivalent noise bandwidth of the span.

Key Path	Marker Function
Mode	VSA, LTE
Help Map ID	25879
Instrument S/W Revision	A.01.60 or later

Band Density Calculation

Turns on the Band/Interval Density function for the selected marker. If the selected marker is off, it is turned on in Normal marker mode and located at the center of the screen.

When Band/Interval Density is selected while in the Marker Function Off state, the Band Span or Interval Span is initialized to 5% of the screen width.

If the detector mode for the detector on the marker's trace is set to Auto, the average detector is selected. If the Average type is set to Auto, Power Averaging is selected. Other choices for the detector or Average type will usually cause measurement inaccuracy.

A band/interval density calculation result may be shown in dBm/Hz, Volts RMS Squared or Volts RMS. The table below shows the choice of display units if Band Density Calculation is set to Mean, depending on the current format of the trace the marker is on.

Trace data type	Trace Format	Result format
-----------------	--------------	---------------

Spectrum, PSD, Time record	LogMag (dB)	dBm/Hz
	Linear Mag, Real, Imag, Wrap Phase, Unwrap Phase, Delay, Log Mag (lin)	Vrms^2/Hz
Dimensionless (e.g., Frequency response, Impulse response, various Demodulation error types)	LogMag (dB)	dBrms/Hz
	Linear Mag, Real, Imag, Wrap Phase, Unwrap Phase, Delay, Log Mag (lin)	rms^2/Hz
General dimensions(e.g., Hz, %)	LogMag (dB)	dB<unit>rms/Hz
	Linear Mag, Real, Imag, Wrap Phase, Unwrap Phase, Delay, Log Mag (lin)	<unit>rms^2/Hz

If the Band Density Calculation is set to RMS, then the readout unit does not depend on trace format. For Spectrum, PSD and Time record traces the displayed unit is "Vrms/rtHz" For general units, the unit abbreviation is shown followed by "rms/rtHz".

The Band Density Calculation only controls the readout format for Normal and Fixed markers. For Delta markers, see the discussion below.

Key Path	Marker Function, Band/Interval Power
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :FUNction:BDENsity:CTYPe MEAN RMS :CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :FUNction:BDENsity:CTYPe?
Example	CALC:VECT:MARK1:FUNC:BDEN:CTYP RMS CALC:VECT:MARK1:FUNC:BDEN:CTYP?
Preset	MEAN
State Saved	Saved in instrument state.
Range	Mean RMS
Help Map ID	25749
Instrument S/W Revision	A.01.60 or later

Band Adjust

These keys allow you to define the bandwidth around the marker. The band is always centered on the marker position. Entering the menu always sets Band/Interval Span as

the active function

Key Path	Marker Function
Mode	VSA, LTE
Help Map ID	25880
Instrument S/W Revision	A.01.60 or later

Band/Interval Center

This function defines the center of the band. That is, it allows you to adjust the marker position in absolute units (regardless of whether the marker mode is Normal or Delta).

Key Path	Marker Function, Band Adjust
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:FU Nction:BAND:CENTer <real> :CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:FU Nction:BAND:CENTer?
Example	CALC:VECT:MARK2:FUNC:BAND:CENT 1.23E+09 CALC:VECT:MARK2:FUNC:BAND:CENT?
Preset	Center of screen
State Saved	Saved in instrument state.
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25712
Instrument S/W Revision	A.01.60 or later

Band/Interval Span

Sets the width of the span for the selected marker. This function defines the span of frequencies or time. The marker position does not change when you adjust the span.

Key Path	Marker Function, Band Adjust
Mode	VSA, LTE

Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :FU Nction:BAND:SPAN <real> :CALCulate:<meas>:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :FU Nction:BAND:SPAN?
Example	CALC:VECT:MARK2:FUNC:BAND:SPAN 1.23E+06 CALC:VECT:MARK2:FUNC:BAND:SPAN?
Preset	When marker turned on, 1/20th of current span or displayed time length
State Saved	Saved in instrument state.
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25750
Instrument S/W Revision	A.01.60 or later

Band/Interval Left

This function adjusts the left side of the band. In order to remain centered in the band, the marker position must also change as you change the left edge. The right edge is unaffected.

Key Path	Marker Function, Band Adjust
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :FU Nction:BAND:LEFT <real> :CALCulate:<meas>:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :FU Nction:BAND:LEFT?
Example	CALC:VECT:MARK2:FUNC:BAND:LEFT 1.23E+06 CALC:VECT:MARK2:FUNC:BAND:LEFT?
Dependencies/Couplings	Changes marker X to keep the marker centered in the band
Preset	When marker turned on, 1/40th of current span or displayed time length left of the marker position
State Saved	Saved in instrument state.
Min	-9.9E+37

Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25751
Instrument S/W Revision	A.01.60 or later

Band/Interval Right

This function adjusts the right side of the band. In order to remain centered in the band, the marker position must also change as you change the right edge. The left edge is unaffected.

Key Path	Marker Function, Band Adjust
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :FU Nction:BAND:RIGHT <real> :CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :FU Nction:BAND:RIGHT?
Example	CALC:VECT:MARK2:FUNC:BAND:RIGHT 1.23E+06 CALC:VECT:MARK2:FUNC:BAND:RIGHT?
Dependencies/Couplings	Changes marker X to keep the marker centered in the band
Preset	When marker turned on, 1/40th of current span or displayed time length right of the marker position
State Saved	Saved in instrument state.
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25752
Instrument S/W Revision	A.01.60 or later

Band Power and Delta Markers

When either a Delta marker or its reference has a band power function turned on, the Delta marker readout always shows a ratio calculation. This allows you to perform common calculations like carrier to noise ratio or adjacent channel power ratio. The form of the ratio depends on the main marker function calculation type (Mean or RMS). If the

main marker function calculation type is Mean, then when you change the marker to Delta the result will be a power ratio. If the main marker function calculation type is RMS, then the Delta marker result will be a voltage ratio. (If the main marker band power function is off, then the form of the ratio depends on the reference marker calculation type: If it is Mean you get a power ratio, and if it is RMS you get a voltage ratio.)

For example, if the main marker function is Band/Interval Power with a calculation type of Mean and the reference marker function is Band/Interval Power with a calculation type of RMS, then the Delta marker will show the ratio of the main marker “Band/Interval Power Mean” value to the reference marker “Band/Interval Power Mean” (not RMS) value.

A dimensionless ratio (for example Volt/Volt or Watt/Watt) is shown with units of "x". The marker function calculation type will tell you whether the ratio is voltage or power (see above). A dimensionless power ratio is shown with units of dB if the trace format is Log Mag (dB)

If the reference marker function is Band/Interval Density and the main marker is either Band/Interval Power or its function is turned off, then the ratio is not dimensionless, but has units of Hz (or dB-Hz) for power calculations, or rtHz for voltage calculations. When the main marker function is Band/Interval Density and the reference is either Band/interval Power or its function is off, the units are /Hz (or dB/Hz) for power calculations, or /rtHz for voltage calculations.

Key Path	Marker Function
Mode	VSA, LTE
Help Map ID	25881
Instrument S/W Revision	A.01.60 or later

Marker To

The Marker -> hardkey provides access to some convenient functions for copying the marker position to a number of frequency and Y-axis scaling parameters. These functions are available from the front panel only. No SCPI is provided, because you can already read the marker position via SCPI and then set any frequency or scaling parameter accordingly, with full accuracy.

Pressing the Marker -> hardkey always makes the selected marker's X position the active function.

If the selected marker is off, pressing the Marker -> hardkey turns on the selected marker in normal mode on the currently selected trace.

Key Path	Front Panel
Mode	VSA, LTE
Help Map ID	25868
Instrument S/W Revision	A.01.60 or later

Mkr -> CF (Center Frequency)

This function sets the center frequency equal to the selected marker's absolute frequency. The marker must be on a frequency-domain trace. The absolute marker frequency is used regardless of whether its control mode is Normal, Delta, or Fixed.

If the currently selected marker is not on when this key is pressed, it will be turned on at the center of the screen as a normal type marker.

Key Path	Marker To
Mode	VSA, LTE
Help Map ID	25869
Instrument S/W Revision	A.01.60 or later

Mkr -> CF Step

This function sets the center frequency step size equal to the selected marker's frequency. The marker must be on a frequency-domain trace. The absolute marker frequency is used regardless of whether its control mode is Normal, Delta, or Fixed.

If the currently selected marker is not on when this key is pressed, it will be turned on at the center of the screen as a normal type marker.

Key Path	Marker To
Mode	VSA, LTE

Help Map ID	25870
Instrument S/W Revision	A.01.60 or later

Mkr -> Start

This function sets the start frequency equal to the selected marker's frequency. The marker must be on a frequency-domain trace. The absolute marker frequency is used regardless of whether its control mode is Normal, Delta, or Fixed.

If the currently selected marker is not on when this key is pressed, it will be turned on at the center of the screen as a normal type marker.

Key Path	Marker To
Mode	VSA, LTE
Help Map ID	25871
Instrument S/W Revision	A.01.60 or later

Mkr -> Stop

This function sets the stop frequency equal to the selected marker's frequency. The marker must be on a frequency-domain trace. The absolute marker frequency is used regardless of whether its control mode is Normal, Delta, or Fixed.

If the currently selected marker is not on when this key is pressed, it will be turned on at the center of the screen as a normal type marker.

Key Path	Marker To
Mode	VSA, LTE
Help Map ID	25872
Instrument S/W Revision	A.01.60 or later

Mkr Delta -> Span

This function sets the start and stop frequencies to equal to the selected marker's frequency and that of its reference. That is, the measurement span is "zoomed in" so that the selected marker and its associated reference appear on the extreme left and right of the display. The marker must be on a frequency-domain trace and its control mode must be Delta.

Key Path	Marker To
Mode	VSA, LTE
Help Map ID	25873
Instrument S/W Revision	A.01.60 or later

Mkr -> Ref Lvl

This function sets the Y axis reference value equal to the selected marker's Y value. For example, if the reference position is at the top of the screen, the whole trace is moved up so that the marker appears at the top of the screen. Note that this is a display scaling function only. The input range remains the same.

Key Path	Marker To
Mode	VSA, LTE
Help Map ID	25874
Instrument S/W Revision	A.01.60 or later

Counter -> CF (Center Frequency)

This function copies the frequency of the marker counter to the center frequency. The marker counter function must be on.

Key Path	Marker To
Mode	VSA, LTE
Help Map ID	25875
Instrument S/W Revision	A.01.60 or later

Mkr Delta -> CF (Center Frequency)

This function sets the center frequency equal to the difference in frequency between the selected Delta marker and its reference. The marker must be on a frequency-domain trace and the selected marker's control mode must be Delta.

Key Path	Marker To
Mode	VSA, LTE
Help Map ID	25876
Instrument S/W Revision	A.01.60 or later

Meas Setup

The functions in this section are common to all VSA based measurements, so they are described here rather than in each Measurement PD. Any variation from these descriptions for a particular measurement, e.g. in range or default, will be documented as needed in that measurement's PD

This key accesses a menu of keys that select measurement functions for VSA based Measurements.

Key Path	Front Panel
Mode	VSA, LTE
Help Map ID	25933
Instrument S/W Revision	A.01.60 or later

Avg Number

This key allows you to turn averaging on or off, and set the number of scans (time records) whose measurement results will be averaged. Averaging can be done over spectrum results (RMS) or over time records (Time). A third kind of pseudo averaging displays the maximum value seen at each spectral line over the specified number of scans. See Average Type for a more detailed description of how measurement results are averaged.) For RMS or Time averaging, the process is similar. Each time an averaged result is displayed, it is the sum of the individual results taken since measurement restart, divided by the number of scans. (For Max averaging, there is no actual summation or division.) The Measurement Bar shows the number of scans and the Avg number setting; for example, if 4 scans have been taken and the Avg Number is 10, the Meas Bar shows "4/10". The measurement continues to take new scans until the number of scans is equal to the Avg Number setting, at which time the measurement stops if Sweep control is in Single Mode. Otherwise, the measurement continues, and the Average Mode setting determines how successive scans are added to the averaged result. See the Average Mode topic for details.

Key Path	Meas Setup, More
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk

Remote Command	[:SENSe] : <meas> : AVERAge : COUNT <integer>
	[:SENSe] : <meas> : AVERAge : COUNT ?
	[:SENSe] : <meas> : AVERAge [:STATe] OFF ON 0 1
	[:SENSe] : <meas> : AVERAge [:STATe] ?

Example	VECT: AVER: COUN 20 VECT: AVER: COUN? VECT: AVER ON VECT: AVER?
Notes	If an averaged measurement is idle because the scan count is equal to the Avg Number, and the Avg Number is increased, the measurement will resume until the new number of averages is satisfied.
Preset	10 OFF IPOW: ON
State Saved	Saved in instrument state.
Min	1
Max	2147483647
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Yes
Help Map ID	25781
Instrument S/W Revision	A.01.60 or later

Average Mode

The Average Mode determines what happens when the Sweep Mode is Continuous and the number of scans processed exceeds the Average Number (see above). If the Sweep Control is in Single mode, this setting has no effect.

When averaging is on and the number of scans is less than or equal to the Avg Number setting, a linear average is calculated as explained in the Avg Number topic. After the scan count exceeds the Avg Number setting, the measurement continues to take new scans. The Measurement Bar average indicator shows ">N/N" where N is the Avg Number.

If Average Mode is Exp then new results are averaged in exponentially. In other words, each succeeding average will be the weighted sum of the previous average, weighted by $(N-1)/N$, and the new measurement, weighted by $1/N$, where N is the Average Number setting. (For Max averaging, no weighting occurs; the result continues to be the max value seen at each spectral line for every previous scan since measurement restart.)

If Average Mode is Repeat, then the average buffer will be cleared after the average counter reaches the Average Number setting, and the average counter will be reset to 0. Then a new set of averages is taken. The measurement bar therefore continues to show "k/N" in the average indicator, where k is the number of scans since the last time the average buffer was cleared and N is the Avg Number. The averaged result is the sum of the last k results divided by k. (For Max averaging, no sum or division takes place, but the buffer is cleared as stated above. The averaged result is the max value seen over the last k

scans.)

Key Path	Meas Setup
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	[:SENSe] : <meas> : AVERage : TCONtrol EXPonential REPeat [:SENSe] : <meas> : AVERage : TCONtrol?
Example	VECT:AVER:TCON EXP VECT:AVER:TCON?
Preset	EXP
State Saved	Saved in instrument state.
Range	Exp Repeat
Help Map ID	25782
Instrument S/W Revision	A.01.60 or later

Average Setup

This key accesses a menu allowing you to set Averaging parameters for all VSA based measurements.

Key Path	Meas Setup
Mode	VSA, LTE
Help Map ID	25899
Instrument S/W Revision	A.01.60 or later

Average Type

The Average Type key allows you to select the type of averaging. The table below shows what measurement results are averaged for each average type. This applies in the Vector Measurement. For the other measurements, details of additional results that is averaged will be given in the measurement PD.

Average Type	Measurement result averaged
RMS	Spectrum, PSD: Power is averaged for each spectral line (i.e., this is a mean-square average of voltage). For the Spectrum result only, if the display transform is linear or real, the RMS result is displayed.
Time	Main Time: Individual time samples in the current time record are averaged vectorially (not RMS) with corresponding points in previous time records.

Max Spectrum, PSD: Not strictly an average. For each spectral line, power from the current measurement is compared to the average buffer value and the maximum is kept in the average buffer.

Instrument S/W Revision A.01.60 or later

Some measurement results are inherently averaged, and are not affected by the Average controls. These are: CCDF, CDF, and PDF. They average continuously until the next measurement restart.

Key Path	Meas Setup, Average Setup
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	[:SENSE] :<meas>:AVERage:TYPE RMS TIME MAXimum [:SENSE] :<meas>:AVERage:TYPE?
Example	VECT:AVER:TYPE RMS VECT:AVER:TYPE?
Preset	RMS
State Saved	Saved in instrument state.
Range	RMS Time Max
Help Map ID	25783
Instrument S/W Revision	A.01.60 or later

Fast Average

Fast average controls the display of average data. If fast averaging is off, then the display is updated after each time record is processed. If fast averaging is on, then the display is only updated after every M records, where M is the Update Rate (see below). For example, if the fast average count is 10, then the running average is only displayed every 10th time record.

Key Path	Meas Setup, Average Setup
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	[:SENSE] :<meas>:AVERage:FAST OFF ON 0 1 [:SENSE] :<meas>:AVERage:FAST?
Example	VECT:AVER:FAST ON VECT:AVER:FAST?

Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Help Map ID	25784
Instrument S/W Revision	A.01.60 or later

Update Rate

The Update Rate controls how often the display updates when fast averaging is turned on. If the Fast Averaging State is MAX then the display is updated only after the full Average Count is reached. Otherwise, the display is updated whenever the average count is a multiple of the Update Rate..

Key Path	Meas Setup, More, Average Setup
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk

Remote Command	[: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?
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Example	VECT:AVER:FAST:URAT 20 VECT:AVER:FAST:URAT? VECT:AVER:FAST:URAT:AUTO ON VECT:AVER:FAST:URAT:AUTO?
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Preset	10 ON
State Saved	Saved in instrument state.
Min	1
Max	2147483647
Test MIN/MAX/DEF	No
Test UP/DOWN	Yes
Help Map ID	25785
Instrument S/W Revision	A.01.60 or later

Peak Search

The Peak Search hardkey displays a menu that allows markers to be easily moved among peaks on a trace, and also performs the peak search function, as described below. Pressing Peak Search also makes the selected marker's X position the active function.

The peak search function causes the marker to move to the highest point in the trace. The highest point is the point with the largest y-axis value in the current trace format. If the format is complex (vector or constellation) then the point with the highest magnitude is chosen.

NOTE The peak threshold default setting may not be useful for every situation and that the actual value used must be derived from the actual measured power spectral density such that the threshold is above the noise but below the lowest peak that needs to be identified by NEXT RIGHT or other peak search functions.

Pressing the Peak Search hard key always performs a Peak Search, with one exception: if the Peak Search menu is not showing but the selected marker is on (Normal, Delta, or Fixed), then pressing the Peak Search hardkey only displays the Peak Search menu. This allows you to select one of the other peak search functions without disturbing the selected marker's position. If you want to perform a peak search in this case, press the Peak Search hardkey again.

If the selected marker is Off, then pressing the Peak Search hardkey once not only shows the menu, but it turns on the selected marker in Normal mode, assigns it to the selected trace, and performs a peak search.

If any peak search SCPI command is invoked on a marker that is Off, the marker is first turned on in Normal mode and assigned to the selected trace. Then the peak search is performed.

Key Path	Peak Search (press hardkey twice if menu is not showing)
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :MA Ximum
Example	CALC:VECT:MARK2:MAX

Notes	There is no softkey for this function. Instead, you press the Peak Search hardkey twice. (Pressing it once is sufficient if the Peak Search menu is showing, but twice guarantees that the function will be invoked) If peak search function is not invoked (because the response to pressing the hardkey was only to show the menu) then the following message is shown: "Press Peak Search again to perform a Peak Search."
Help Map ID	25865
Instrument S/W Revision	A.01.60 or later

Next Peak (Next Lower Amptd)

This command moves the marker to the peak next lower in Y value than the peak it is currently on. If the format is complex (vector or constellation) then the marker moves to the closest point that has a lower magnitude than the marker's current position. If this function is invoked via SCPI on a marker that is off, the result is the same as if you sent a Peak Search command.

Key Path	Peak Search
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :MA Ximum:NEXT
Example	CALC:VECT:MARK2:MAX:NEXT
Help Map ID	25741
Instrument S/W Revision	A.01.60 or later

Next Higher Amptd

This command moves the marker to the peak next higher in Y value than the peak it is currently on. . If the format is complex (vector or constellation) then the marker moves to the closest point that has a higher magnitude than the marker's current position. If this function is invoked via SCPI on a marker that is off, the result is the same as if you sent a Peak Search command.

Key Path	Peak Search
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk

Remote Command	:CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MAXimum:PREVIOUS
Example	CALC:VECT:MARK2:MAX:PREV
Help Map ID	25742
Instrument S/W Revision	A.01.60 or later

Next Right

This command moves the marker to the next peak to the right of its current position. If the format is complex (vector or constellation) then the marker moves forward in time to the next peak. If this function is invoked via SCPI on a marker that is off, the result is the same as if you sent a Peak Search command.

A valid peak is one for which the displayed Y-axis values drop monotonically on both sides of the local maximum at least 4% of the distance between the top and bottom of the display grid before the values begin to rise again.

Key Path	Peak Search
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MAXimum:RIGHT
Example	CALC:VECT:MARK2:MAX:RIGH
Help Map ID	25743
Instrument S/W Revision	A.01.60 or later

Next Left

This command moves the marker to the next peak to the left of its current position. If the format is complex (vector or constellation) then the marker moves back in time to the next peak. If this function is invoked via SCPI on a marker that is off, the result is the same as if you sent a Peak Search command.

A valid peak is one for which the displayed Y-axis values drop monotonically on both sides of the local maximum at least 4% of the distance between the top and bottom of the display grid before the values begin to rise again.

Key Path	Peak Search
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk

Remote Command	:CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MAXimum:LEFT
Example	CALC:VECT:MARK2:MAX:LEFT
Help Map ID	25744
Instrument S/W Revision	A.01.60 or later

Mkr -> CF (Center Frequency)

This key is a duplicate of the key of the same name in the Mkr -> menu. It is placed in this menu as a convenience. See the description in the Marker To section.

Key Path	Peak Search
Mode	VSA, LTE
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

Continuous Peak Search

This key turns on Continuous Peak Search for the selected marker. This function be turned on for any marker independently of any other marker. This function moves the marker to the highest point on the trace each time the trace is updated. If the SCPI command refers to a marker that is off, it is turned on in Normal mode.

It is possible to have Couple Markers and Continuous Peak Search both on. If this is the case, it is recommended that Continuous Peak search be turned on for only one marker in any tracking set (that is, any set of markers with the same or equivalent domain). Otherwise, conflicts over marker position may arise that cause erratic marker movement.

Key Path	Peak Search
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPower IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:CPSearch[:STATe] ON OFF 1 0 :CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:CPSearch[:STATe]?
Example	CALC:VECT:MARK1:CPS ON

Dependencies/Couplings	The Continuous Peak Search key is grayed out when the selected marker is a Fixed marker. Also, if Continuous Peak Search is on and the selected marker becomes a fixed marker, then Continuous Peak Search is turned off and the key grayed out. Continuous Peak Search is turned off when the selected marker is turned off.
Preset	OFF
State Saved	Saved in instrument state.
Range	Off On
Help Map ID	25745
Instrument S/W Revision	A.01.60 or later

Min Search

This command moves the marker to the lowest Y value on the trace. If the format is complex (vector or constellation) then the marker moves to the lowest value in magnitude. If the SCPI command refers to a marker that is off, it is first turned on in Normal mode and then set on the minimum point.

Key Path	Peak Search
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MINimum
Example	CALC:VECT:MARK2:MIN
Help Map ID	25746
Instrument S/W Revision	A.01.60 or later

Mkr -> Ref Lvl (Reference Level)

This function sets the Y axis reference value equal to the selected marker's Y value. For example, if the reference position is at the top of the screen, the whole trace is moved up so that the marker appears at the top of the screen. Note that this is a display scaling function only. The input range remains the same.

Key Path	Peak Search
Mode	VSA, LTE
Help Map ID	25867
Instrument S/W Revision	A.01.60 or later

Recall

Recall functionality is common across multiple Modes and Measurements. These common features are described in this section.

The Recall feature prompts you to answer the questions: What do you want to recall? And to where do you want to recall it? Once these questions are answered the recall can occur. The options in this menu answer the question "What do you want to Recall?"

The options are State, Trace and Data. (Screen Image can be saved, but not recalled.) The default paths for Recall are data type dependent and are the same as for Save.

For more information see Common Measurement Functions, ["Recall" on page 861](#)

Key Path	Recall
Remote Command Notes	No remote command directly controls the Recall Type that this key controls. The Recall type is a node in the :MMEM:LOAD command. An example is :MMEM:LOAD:STATE <filename>.
Instrument S/W Revision	A.01.60 or later

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/hold 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

For more information see Common Measurement Functions, “Restart” on page 879

Remote Command:	:INITiate[:IMMEDIATE]
Example:	:INIT:IMM
Dependencies/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.
Remote Command Notes:	:INITiate:RESTART :INITiate:IMMEDIATE Either of the above commands perform exactly the same function.
SCPI 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.
Instrument S/W Revision:	A.01.60 or later
Remote Command:	:INITiate:RESTART
Example:	:INIT:REST
Dependencies/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.
Remote Command Notes:	:INITiate:RESTART :INITiate:IMMEDIATE Either of the above commands perform exactly the same function.

SCPI 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.
Instrument S/W Revision:	A.01.60 or later

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

Save functionality is common across multiple Modes and Measurements. These common features are described in this section.

The Save feature prompts you to essentially answer the questions: What do you want to save? And where do you want to save it? Once these questions are answered the save can occur. The options in this menu answer the question, "What do you want to save?"

Accesses a menu that provides the save type options. The **Save Type** options are **State**, **Trace**, **Data**, or a **Screen Image** depending on the active mode.

For more information see Common Measurement Functions, "[Save](#)" on page 881

Remote Command Notes	No remote command for this key specifically.
Instrument S/W Revision	A.01.60 or later
Key Path	Save
Mode	All

Single (Single Measurement/Sweep)

Single 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.

Example: :INIT:CONT OFF

Remote Command Notes: See **Cont** key description.

Key Path: **Front-panel key**

Instrument S/W Revision: A.01.60 or later

Source

The Source function is not available for this mode.

Key Path	Front Panel
Mode	VSA, LTE
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

Sweep / Control

This section describes the keys in the Sweep, Control and Capture menu that are common to multiple Modes and Measurements. See the Measurement descriptions for information on features that are unique.

The Meas Uncal (measurement uncalibrated) warning is given in the Status Bar in the lower right corner of the screen when the manual sweep time entered is too fast to give accurate measurements with the current setting of Res BW. When this happens, increase the Sweep Time or the Res BW.

For more information see Common Measurement Functions, [“Sweep / Control” on page 907](#)

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

SPAN X Scale

This menu has softkeys for selecting measurement span and also for scaling of the X axis.

Key Path	Front Panel
Mode	VSA, LTE
Help Map ID	25890
Instrument S/W Revision	A.01.60 or later

Span

This controls the frequency span of the measurement. This is the full span that is displayed on a spectrum display. The actual IF bandwidth that the time record sees is 1.28 times the span. See the **FREQ Channel** section for details on how this interacts with start, stop, and center frequencies.

Key Path	SPAN/XScale
Mode	VSA, LTE
Remote Command	[:SENSe] :FREQuency:SPAN <freq> [:SENSe] :FREQuency:SPAN?
Example	FREQ:SPAN 10 MHZ FREQ:SPAN?
Dependencies/Couplings	Start Freq and Stop Freq. See narrative under FREQ Channel heading for details.
Preset	depends on span option
State Saved	Saved in instrument state.
Min	2 Hz
Max	depends on span option
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25771
Instrument S/W Revision	A.01.60 or later

Full Span

This immediate action key changes the span to the maximum available. The center frequency remains unchanged, regardless of whether the Frequency Annotation property

is Start/Stop or Center/Span.

Key Path	SPAN/XScale
Mode	VSA, LTE
Remote Command	[:SENSe] :FREQuency :SPAN :FULL
Example	FREQ:SPAN:FULL
Notes	The label on the softkey gives the full span available, which depends on span option.
Dependencies/Couplings	Changes span to maximum while keeping the center frequency constant. Start and Stop frequency are affected
Help Map ID	25772
Instrument S/W Revision	A.01.60 or later

Signal Track

From the point of view of a spectrum display, this function, when turned on, attempts to keep the largest magnitude signal in the center of the screen. 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/XScale
Mode	VSA, LTE
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?
Dependencies/Couplings	Unavailable if averaging is turned on.
Preset	0
State Saved	Saved in instrument state.
Range	On Off
Help Map ID	25773
Instrument S/W Revision	A.01.60 or later

X Axis Scaling

By default, the X axis of a trace is scaled to show all the available data in the trace. (The exception is that in spectrum displays, the edges of the spectrum that may contain aliases

are not shown by default.) However, the X axis can be manually scaled in order to zoom in on a subset of the X values, or to set the X scaling to more convenient numbers. X scaling may be changed even when a measurement is paused or completed, and the display will be updated immediately, using the existing trace data. No measurement parameters are affected and no new measurement is made. X scaling is unique to each trace.

Scaling is based on a reference position, which may be on the left of the grid, in the center, or on the right. The X reference value is assigned to this position. The X Width is the difference between the X value on the right side of the grid and the X value on the left. If the reference is in the center, the right and left are half of the X width away.

If X scaling is set such that the left or right axis boundary falls outside the X range of the available data, the trace is shown correctly on that portion of the display where it belongs.

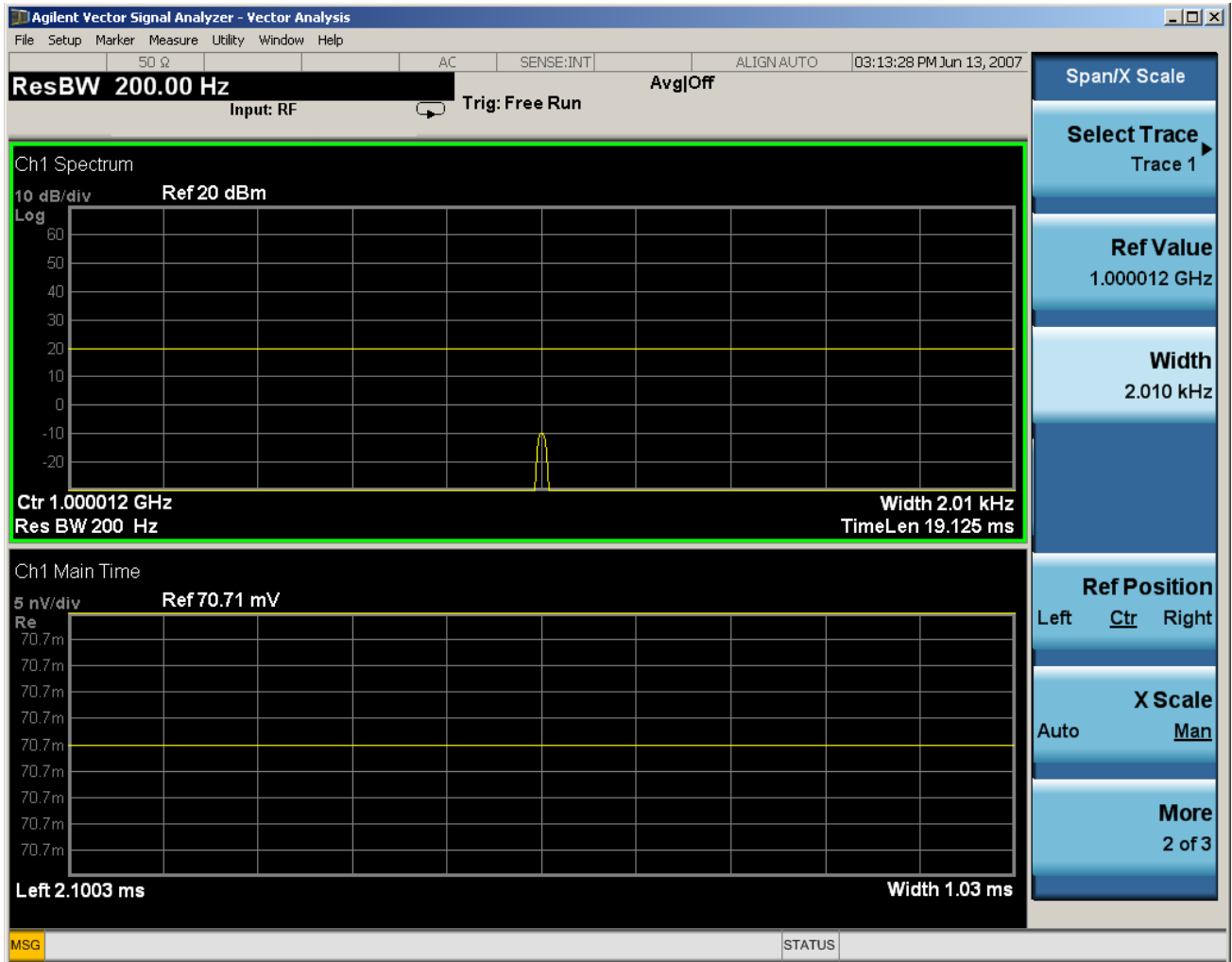
For Vector displays (I-Q and Constellation) the X axis is actually perpendicular to the screen, and the screen's horizontal axis is used for the real part of the Y values. In this case, the X scaling can still be used to only display a portion of the data. In the case of the X reference position, left means the least positive or most negative X value, and right means the most positive or least negative value. For example, when looking at a 10 ms time record of a QPSK signal, you could set the X reference position to left, the X reference value to 4 ms and the X width to 1 ms in order to see just the portion of the signal between 4 and 5 ms. This same portion would be shown if IQ format were chosen (even though the time axis is not visible in this case).

For Symbol tables, which are not graphed but displayed in alphanumeric, X scaling can also be used to display a portion of the complete data. For example, you can set the X reference position to left, the X reference value to 20 symbols, and the X width to 10 symbols to see symbols 20 through 30. If then change the X reference position to center, you will see symbols 15 through 25, and if you change the X reference position to right you will see symbols 10 through 20.

Annotation for the X axis is just below the grid on the left and right side. It is based on whether the X Scaling is Auto or Man. If it is Auto, then the left side is annotated with either "Center" or "Start", and the right side is annotated with either "Span" or "Stop" followed by the appropriate numbers and units. The Center/ Span pair is only used for Spectrum or PSD traces, and only if the Freq Annotation property is Center/Span (see Freq Annotation under the FREQ key).



If X Scaling is Man, the annotation for the left side is "Left | Ctr | Right <x_reference_value> <unit>" (depending on the X reference position), and on the right side the annotation is "Width <x_width> <unit>". Shown below is an illustration of two of these manual X scale annotations:



For Vector displays, the X axis annotation is replaced by annotation for the real part of the Y value, each annotation consisting of number followed by a unit (usually volts).

Key Path	SPAN X Scale
Mode	VSA, LTE
Help Map ID	25891
Instrument S/W Revision	A.01.60 or later

Select Trace

This function is a duplicate of the same function found on the Trace/Detector menu. See the description there for details. It is placed here to allow you to conveniently choose which trace the X scaling applies.

Key Path	SPAN X Scale, X Axis Scaling
Mode	VSA, LTE

Help Map ID	0
Instrument S/W Revision	A.01.60 or later

X Scale

If this function is set to Auto, it causes the trace to display all available trace data. (Exception: the display of the outer edges of a spectrum which may contain aliases is governed by the All Frequency Points function setting – see below.). The annotation is updated as needed, but the X Reference Value and X Width keys are grayed out and not updated. When this function is set to Man, the X Reference Value and X Width softkey readbacks are updated with the current values.

Key Path	SPAN/XScale
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4:X[:SCALe]:COUPle OFF ON 0 1 :DISPlay:<meas>:TRACe[1] 2 3 4:X[:SCALe]:COUPle?
Example	:DISP:VECT:TRAC1:X:COUP ON DISP:VECT:TRAC1:X:COUP?
Dependencies/Couplings	Forced to Man if X Reference Value or X Width is set by user.
Preset	1
State Saved	Saved in instrument state.
Range	Auto Man
Help Map ID	25777
Instrument S/W Revision	A.01.60 or later

X Reference Value

This function controls the X value of the selected trace at the chosen X Reference Position (see below). It has no effect on hardware input settings.

Key Path	SPAN/XScale
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4:X[:SCALe]:RLEVel <real> :DISPlay:<meas>:TRACe[1] 2 3 4:X[:SCALe]:RLEVel?

Example	DISP:VECT:TRAC:X:RLEV 1e9 DISP:VECT:TRAC:X:RLEV?
Dependencies/Couplings	If X Scale is set to Auto, the X Reference Value is determined by the trace data and this key is grayed out.
Preset	Depends on trace
State Saved	Saved in instrument state.
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25774
Instrument S/W Revision	A.01.60 or later

X Width

This sets the width of the X axis that is displayed for the selected trace. The X width may be set less than the Span for frequency-domain traces, allowing you to zoom in on just a portion of the measured values. Likewise it may be less than time span covered by time-domain data. This plus the X Reference Value and X Reference Position control the range of X values that may be displayed on a trace. For example, if the X Reference position is Center, the X Reference value is 1 GHz and the X Width is 20 MHz.

Key Path	SPAN/XScale
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4 : X [: SCALE] : SPAN <real> :DISPlay:<meas>:TRACe[1] 2 3 4 : X [: SCALE] : SPAN?
Example	DISP:VECT:TRAC:X:SPAN 10e6 DISP:VECT:TRAC:X:SPAN?
Dependencies/Couplings	If X Scale is set to Auto, the X Width is determined by the trace data and this key is grayed out.
Preset	Depends on trace
State Saved	Saved in instrument state.
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No

Test UP/DOWN	No
Help Map ID	25775
Instrument S/W Revision	A.01.60 or later

X Reference Position

This determines the position from which the X scaling is calculated for the selected trace. It may be set to the left side, center, or right side of the grid.

Key Path	SPAN/XScale
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4:X[:SCALE]:RPOSition LEFT CENTer RIGHT :DISPlay:<meas>:TRACe[1] 2 3 4:X[:SCALE]:RPOSition?
Example	DISP:VECT:TRAC1:X:RPOS LEFT DISP:VECT:TRAC1:X:RPOS?
Dependencies/Couplings	If X Scale is set to Auto, the X Reference Position is determined by the trace data and this key is grayed out.
Preset	CENT
State Saved	Saved in instrument state.
Range	Left Ctr Right
Help Map ID	25776
Instrument S/W Revision	A.01.60 or later

All Frequency Points

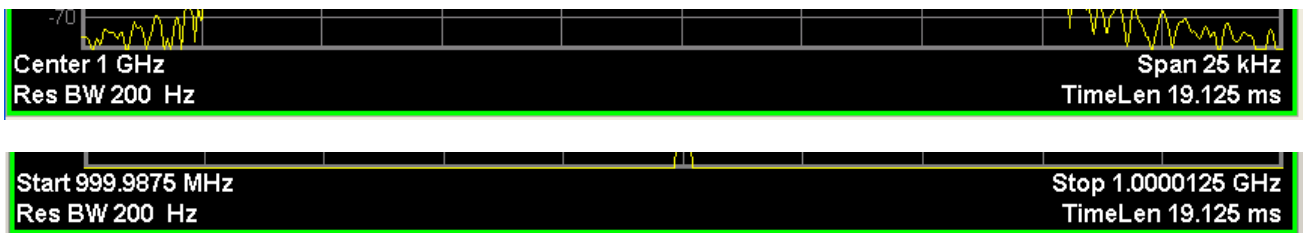
Spectrum trace data (and PSD) are based on the FFT algorithm. By default, the outer edges of the spectrum are not displayed because they may show spurious results that are aliases of real signals that are not completely filtered out by the IF filter. For example, in the case of a 1024 point FFT only 801 points are displayed. If you want to view the additional FFT points at the edges of spectral displays, turn this function on. It is global to all traces, not specific to a single trace.

Key Path	SPAN/XScale
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk

Remote Command	:DISPlay:<meas>:AFPPoints OFF ON 0 1 :DISPlay:<meas>:AFPPoints?
Example	DISP:VECT:AFP ON DISP:VECT:AFP?
Notes	ac
Dependencies/Couplings	Only applies if trace is showing Spectrum or PSD results.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Help Map ID	25778
Instrument S/W Revision	A.01.60 or later

Freq Annotation

This controls how Spectrum and PSD traces are annotated when their X Scale is set to Auto. If Freq Annotation is set to Center/Span, the X-axes on windows containing frequency domain traces are labeled with the center frequency on the left and the span on the right. If the Freq Annotation is set to Start/Stop, then the start and stop frequencies appear in place of center and span. If the X Scale is manual, then this annotation style does not apply.



Key Path	SPAN/XScale
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:FANNotation CSPan SSTop :DISPlay:<meas>:FANNotation?
Example	DISP:VECT:FANN CSP DISP:VECT:FANN?
Preset	CSP
State Saved	Saved in instrument state.

Range	Center/Span Start/Stop
Help Map ID	25797
Instrument S/W Revision	A.01.60 or later

Copy X Scale

This front-panel only function copies the following X scaling information from the selected trace to another:

- X reference Position
- X Reference Value
- X Width
- X Scale (Auto/Man)
-

Key Path	SPAN X Scale, X Axis Scaling
Mode	VSA, LTE
Help Map ID	25892
Instrument S/W Revision	A.01.60 or later

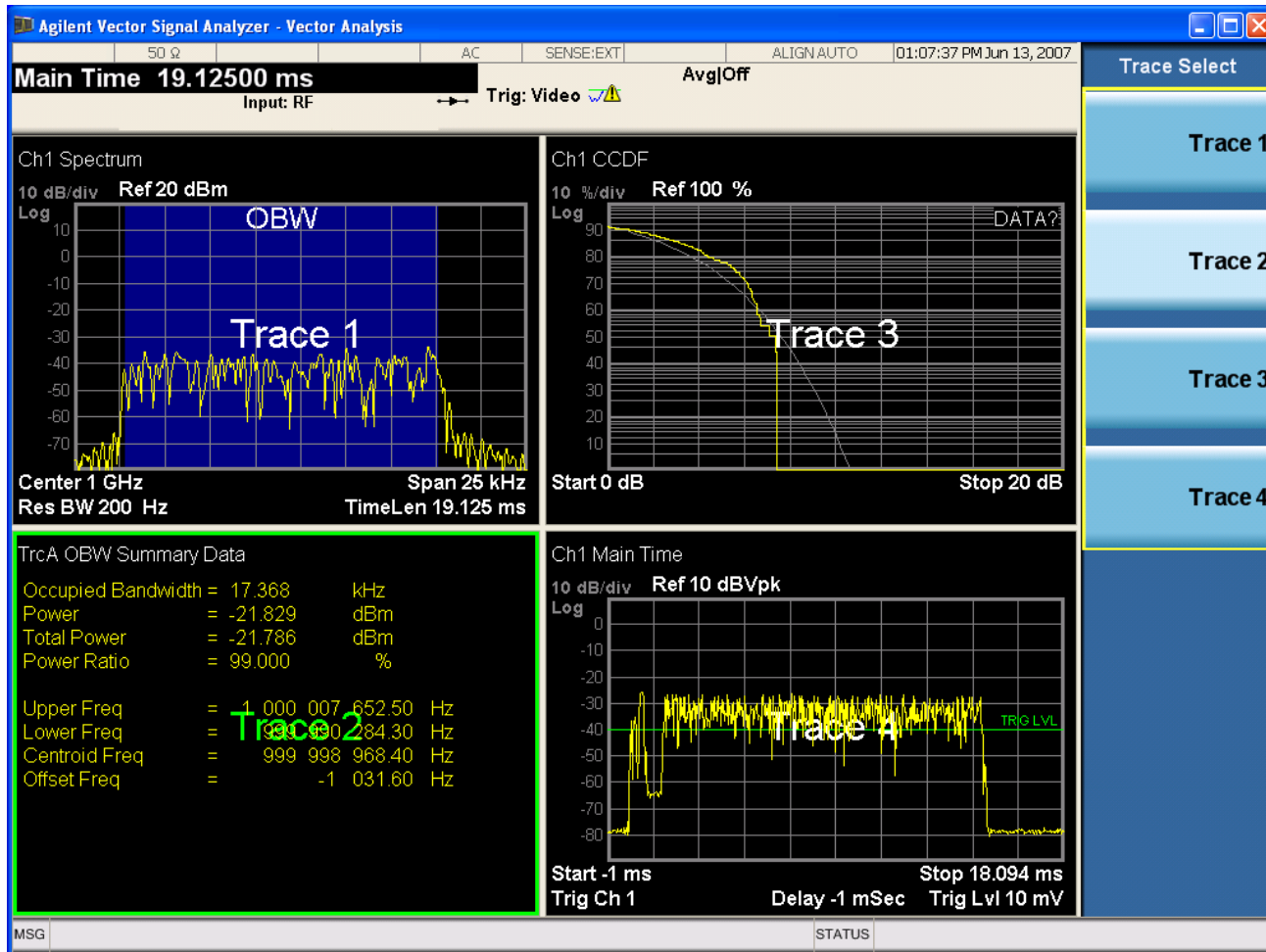
Trace/Detector

This key accesses a menu allowing you to select various trace parameters for all VSA based measurements.

Key Path	Front Panel
Mode	VSA, LTE
Help Map ID	25893
Instrument S/W Revision	A.01.60 or later

Select Trace

This softkey brings up a menu that allows you to select the trace that is to receive the action of all successive trace-specific commands like scaling, assignment of trace data, etc. The selected trace is outlined in green and is always made visible. While the Select Trace menu is showing, Each visible trace is annotated in the middle with its own trace number, as shown: below. The trace number annotations disappear when any other menu is showing.



Grid 2x2 layout showing trace annotations when Trace Select dialog is active

This softkey also appears in the X and Y scaling menus. There is only one selected trace at any time. If you change which trace is selected, that change is reflected in this softkey/menu wherever it appears. Other ways to select a trace include use of the Next Window key, clicking within a trace window with a mouse cursor, and issuing a trace-specific SCPI command.

There is no SCPI command associated with this function. Instead, SCPI commands that are trace-specific have an index on the TRACe node that determines the selected trace. Using such a command has the side effect that the trace addressed by the SCPI command becomes the selected trace for any front panel interaction.

Key Path	Trace/Detector (also Span / X Scale or AMPTD ? Y Scale)
Mode	VSA, LTE
Notes	No SCPI. Front panel only.
Dependencies/Couplings	Affects any trace-specific commands
Range	Trace 1 Trace 2 Trace 3 Trace 4 Trace 5 Trace 6

Help Map ID 25779
 Instrument S/W Revision A.01.60 or later

Data

This accesses a menu of Trace data choices for the selected trace. A VSA Measurement may produce many different results from a single scan; either a graph or a table. In addition, the ACP and OBW functions can be enabled on any trace showing a frequency-domain result, and produce Summary table results. Any of these results may be assigned to a trace and displayed. See the individual measurement PDs for a list of all Trace results that are available for each measurement.

The following Trace Data types are available in all measurements:

Soft Key Name	SCPI string form
No Data	"No Data"
Spectrum	"Spectrum1"
Inst Spectrum	"Inst Spectrum1"
Raw Main Time	"Raw Main Time1"
OBW Summary Trace 1	"OBW Summary Trc1"
OBW Summary Trace 2	"OBW Summary Trc2"
OBW Summary Trace 3	"OBW Summary Trc3"
OBW Summary Trace 4	"OBW Summary Trc4"
ACP Summary Trace 1	"ACP Summary Trc1"
ACP Summary Trace 2	" ACP Summary Trc2"
ACP Summary Trace 3	" ACP Summary Trc3"
ACP Summary Trace 4	" ACP Summary Trc4"

The following Data Registers are also available for display if there are traces stored in them (see Save and Recall Data, Trace)

"D1", "D2", "D3", "D4", "D5", and "D6"

Key Path Trace/Detector, Data

Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4:FEED <string> :DISPlay:<meas>:TRACe[1] 2 3 4:FEED?
Example	DISP:VECT:TRAC1:FEED "Spectrum1" DISP:VECT:TRAC1:FEED?
Preset	Depends on trace number and measurement
State Saved	Saved in instrument state.
Range	see table above and in individual Measurement PDs
Help Map ID	25798
Instrument S/W Revision	A.01.60 or later

The complete list of Trace Data names that may be assigned using the above SCPI can be obtained by using the following SCPI query:

Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:DATA[1] 2 3 4:NAMES?
Example	CALC:VECT:DATA:NAM?
Notes	Query only. Returns a comma-separated list of trace data names that may be used in DISPlay:<meas>:TRACe[1] 2 3 4:FEED "<string>". The list is the same regardless of trace index.
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

Spectrum

This key assigns the selected trace to display the Spectrum data result.

The Spectrum trace data displays the spectrum of the selected channel. The spectrum computation displays frequency on the x axis and amplitude on the y axis.

The following formulas show how the analyzer calculates spectrum information:

Key: F = Fast Fourier Transform (FFT)
 AF = Averaged spectra
 AT = Averaged time
 f = Instantaneous spectra
 t = Instantaneous time
 W = Windowing function
 n = Average number
 c = Correction trace (from calibration)
 $f[n]^2 = f[n] \times \text{conjugate}(f[n])$
 \times = multiplication

No Average	$f = F(W \times t) \times c$
rms Average	$AF[n] = \frac{1}{n} \text{sum}(f[n]^2)$
rms Exponential AF[n]Average	$AF[n] = \frac{1}{n} (f[n]^2) + \frac{n-1}{n} AF[n-1]$ where $1 \leq n \leq \text{number of averages}$
Continuous Peak Hold Average	$AF[n] = \text{MAX}(AF[n-1], f[n]^2)$
Time Average	$AF[n] = F\{W \times AT[n]\} \times c$ where $AT[n] = \frac{1}{n} \text{sum}(t[n])$
Time Exponential Average	$AF[n] = F\{W \times AT[n]\} \times c$ where $AT[n] = \frac{1}{n} t[n] + \frac{n-1}{n} AT[n-1]$ and $1 \leq n \leq \text{number of averages}$

As shown in the previous formulas, the spectrum may be a linear spectrum or power spectrum as follows:

If the average is...	then the spectrum is...
Averaging OFF	Linear
rms Average	Power
Continuous peak	Power

Linear spectra contain magnitude and phase (real and imaginary) information. Remember however, that scalar measurements (produced by the Spectrum Analyzer application) do

not provide phase information. Therefore, for scalar measurements, linear spectra have no phase information.

Power spectra contain only magnitude (real) information. This occurs with rms averages, for instance, because the results of the FFT are squared. Remember that the FFT yields both real and imaginary information. When the analyzer squares the results of the FFT, the imaginary part becomes zero.

See also Trace/Detector,

Key Path	Trace/Detector, Data
Mode	VSA
Help Map ID	25900
Instrument S/W Revision	A.01.60 or later

Inst Spectrum

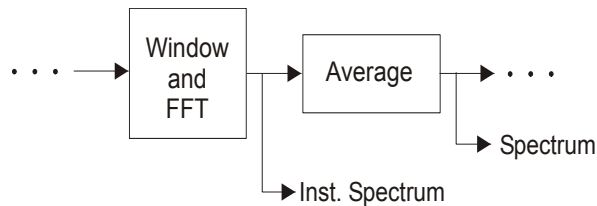
This key assigns the selected trace to display the Inst. Spectrum data result.

Inst Spectrum trace data displays the instantaneous spectrum for the selected input channel. Instantaneous spectrum is computed before data is averaged, which allows you see spectrum data before the data is averaged with other spectrum data.

Note

Inst Spectrum is not available when analog or digital demodulation is selected.

The following block diagram is a portion of the block diagram shown under Vector Block Diagram. It shows where, in the block diagram, spectrum and instantaneous spectrum are created.



This measurement calculation is useful for these types of averaged measurements:

- rms
- rms exponential
- Continuous peak hold

If averaging is off, the spectrum and instantaneous spectrum display the same information.

See also Trace/Detector,

Key Path	Trace/Detector, Data
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Mode	VSA
Help Map ID	25901
Instrument S/W Revision	A.01.60 or later

Main Time

This key assigns the selected trace to display the Main Time data result.

Note that Main Time is not available when analog or digital demodulation is selected.

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.

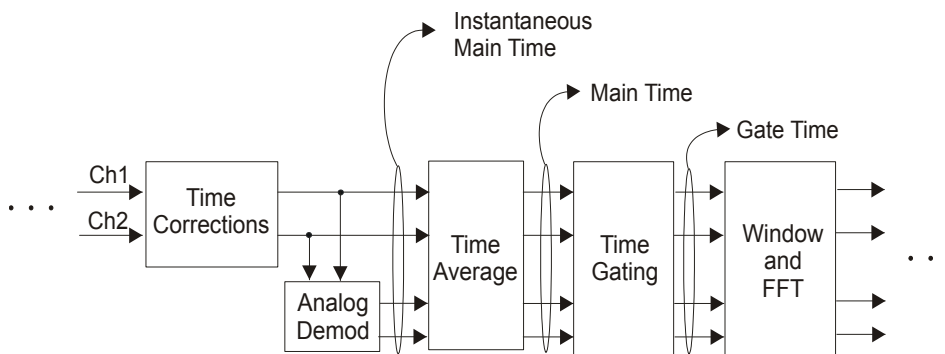
A time record is the basic building block of the Fast Fourier Transform (FFT). The FFT takes the time-domain information in the time record and transforms it into the frequency domain.

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.

Selecting the Main Time trace data displays the entire time record--the main time-record. Selecting the Gate Time trace data displays that portion of the main time-record marked by the gate--the gate time-record.

The following block diagram is a portion of the block diagram shown under Vector Block Diagram. It 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 will be noticeable visible distortion.

The analyzer's anti-alias filters will cause some ringing or distortion of square waves or transients when viewed in the time domain.

See also Trace/Detector,

Key Path	Trace/Detector, Data
Mode	VSA
Help Map ID	25902
Instrument S/W Revision	A.01.60 or later

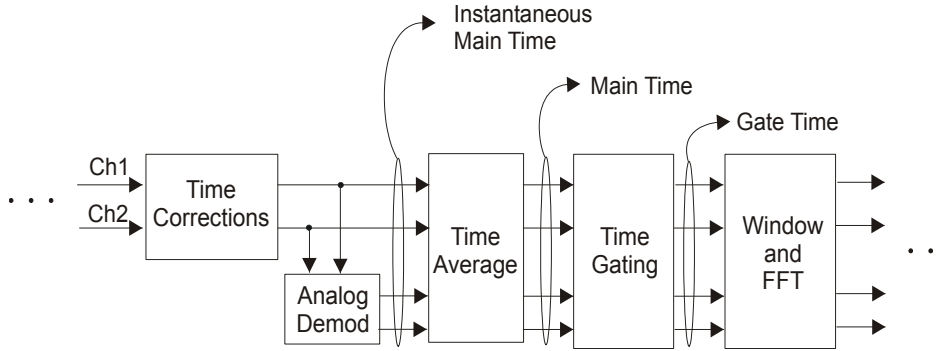
Inst Main Time

This key assigns the selected trace to display the Inst Main Time data result.

Inst Main Time trace data displays the instantaneous time-domain data for the selected input channel.

Note that Inst Main Time is not available when analog or digital demodulation is selected.

The following block diagram is a portion of the Vector Signal Analyzer block diagram. It shows how Instantaneous Main Time is derived.



Notice that Instantaneous Main Time shows you time data before time averaging. If time averaging is off, Instantaneous Main Time is identical to Main Time.

See also Trace/Detector,

Key Path	Trace/Detector, Data
Mode	VSA
Help Map ID	25903
Instrument S/W Revision	A.01.60 or later

Gate Time

This key assigns the selected trace to display the Gate Time data result.

Gate Time trace data displays the selected channel's gate time-record.

Note that Gate Time is not available when analog or digital demodulation is selected.

If time gating is on, Gate Time displays the portion of the main time-record marked by the gate-- this portion is called the gate record (if time gating is off, Gate Time displays nothing).

As a reminder, if time gating is on, the Fast Fourier Transform (FFT) uses the gate time-record, which can be all or a portion of the main time-record, to compute frequency information such as spectrum, frequency response, coherence, and correlation.

See also Trace/Detector,

Key Path	Trace/Detector, Data
Mode	VSA
Help Map ID	25904
Instrument S/W Revision	A.01.60 or later

Raw Main Time

This key assigns the selected trace to display the Raw Main Time data result.

Raw Main Time is the raw data read from the input hardware or playback file. It is similar

to Main Time with the following exceptions:

- This data has not had time corrections applied, so it displays a "CAL?" trace LED.
- The data has not gone through the analyzer's software resampling filters, so is generally not sampled at the specified sample rate.
- The data has a wider bandwidth than the measurement span would indicate.

Raw Main Time data is useful in the following situations:

- When you use Channel, IF Magnitude, or Magnitude trigger types, the input hardware detects the trigger, so Raw Main Time sometimes gives a better indication of what caused the trigger.
- When you play back a recording, the Raw Main Time measurement data allows you to see exactly the samples that are saved in the recording, with no filtering applied or settling removed.

See also Trace/Detector,

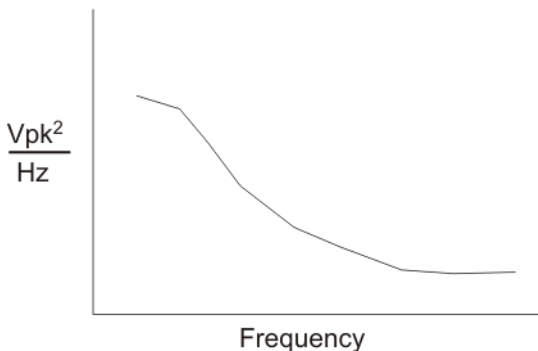
Key Path	Trace/Detector, Data
Mode	VSA
Help Map ID	25905
Instrument S/W Revision	A.01.60 or later

PSD (Power Spectral Density)

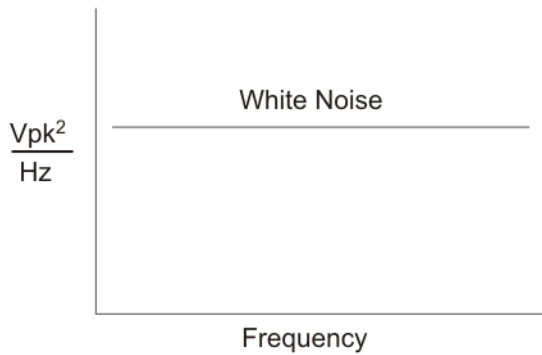
This key assigns the selected trace to display the Power Spectral Density (PSD) data result.

PSD trace data displays the power spectral density (PSD) of the selected channel.

The definition of PSD yields y-axis units of V_{pk}^2/Hz and x-axis units of frequency:



PSD is used for noise measurements. It shows the power density of a signal as a function of frequency. In general, noise may have any arbitrary frequency content, resulting in a variety of possible PSD shapes. Noise that has equal power density at all frequencies is called white noise:



The definition of PSD is power per Hertz. In other words, power is divided by the measurement bandwidth, which in this analyzer is the resolution bandwidth (ResBW), as follows:

$$\frac{V_{pk}^2}{RBW} = \frac{V_{pk}^2}{Hz}$$

Units of V_{pk}^2/Hz assumes the signal is referenced to 1 ohm. That is, because no resistance is specified, the signal is interpreted as a voltage across a one ohm resistor, with the power in the resistor equal to V_{pk}^2 .

You can select units of dBm/Hz to take into account the analyzer's input impedance. PSD defaults to these units. The analyzer calculates dBm/Hz as follows:

$$\frac{dBm}{Hz} = 10 \log \left[\frac{\frac{V_{rms}^2}{Z} \times 1000}{RBW} \right]$$

where:

RBW = resolution bandwidth (Hz)

Z = input impedance

See also Trace/Detector,

Key Path	Trace/Detector, Data
Mode	VSA
Help Map ID	25906
Instrument S/W Revision	A.01.60 or later

CCDF (Complementary, Cumulative Density Function)

This key assigns the selected trace to display the CCDF data result.

CCDF trace data displays the complementary, cumulative density function (CCDF) for the selected input channel.

The complementary, cumulative density function (CCDF) is a statistical-power calculation and can be performed only on time-domain data. As its name suggests, CCDF is the complement of CDF, and is defined as follows:

$$\text{CDF}(K) = \text{Probability}(x \leq K)$$
$$\text{CCDF}(K) = \text{Probability}(x > K)$$

CCDF provides better resolution than CDF for low probability signals, especially when log format is used for the y-axis.

The analyzer plots CCDF using units of percent (%) for the y-axis and power (dB) for the x-axis. Power on the x-axis is relative to the signal average power, so 0 dB is the average power of the signal. Therefore, a marker readout of

Trace A Marker 2 dB 12 %

means there is a 12% probability that the signal power will be 2 dB or more above the average power.

CCDF Calculation:

Calculate the RMS value for all measured samples; this becomes the 0 dB point at the left end of the x-axis.

Normalize all samples to the RMS value in units of dB.

Determine which x-axis bin each sample belongs in between 0 and 20 dB.

Calculate the total number of samples that are greater than or equal to each x-axis bin and plot as a percent of the number of samples measured.

Samples Used in the Power Measurement

For the Demod Off and Analog demod modes, the analyzer computes CCDF using all samples in the current time record (all points in the active trace). Each successive time record adds additional samples to the CCDF measurement.

For WLAN - OFDM and -DSSS demod modes, the analyzer computes CCDF using all samples specified within the measurement interval.

Restarting the Power Measurement

Selecting CCDF, restarting the measurement, or changing most measurement parameters restarts the CCDF measurement. For example, changing the range or center frequency resets the number of samples used in the CCDF measurement to zero and restarts the CCDF measurement.

Tips

Note the following when making CCDF measurements:

- For best results, set the analyzer's displayed frequency span to include all the energy of your signal. In other words, make sure the displayed frequency span includes the entire bandwidth of the measured signal.

- The CCDF measurement does not restart:
- After a calibration
- After you continue a paused measurement
- Many channel specific changes restart the CCDF measurement on both channels, such as changing the gate delay, or input coupling.
- The analyzer displays DATA? if the average power drifts 8 to 10 dB from the average power measured in the first time record. For example, the analyzer would display DATA? if you measured a transmitter signal that was off when the CCDF measurement started but then turned on later in the measurement.
- CCDF measurements are disabled during time averaging.

See also Trace/Detector,

Key Path	Trace/Detector, Data
Mode	VSA
Help Map ID	25907
Instrument S/W Revision	A.01.60 or later

CDF (Cumulative Density Function)

This key assigns the selected trace to display the CDF data result.

CDF trace data displays the Cumulative Density Function (CDF) for the selected input channel. CDF is computed by integrating the PDF (Probability Density Function). CDF is explained in online help for the CCDF trace data^{3/4}for further details, see that topic

See also Trace/Detector,

Key Path	Trace/Detector, Data
Mode	VSA
Help Map ID	25908
Instrument S/W Revision	A.01.60 or later

PDF (Probability Density Function)

This key assigns the selected trace to display the PDF data result.

PDF trace data displays the Probability Density Function of the selected channel. PDF indicates the probability that a given level has occurred.

PDF is equivalent to a normalized histogram. A histogram shows how the amplitude of a signal is distributed between its maximum and minimum values. Amplitude is displayed on the X-axis, and number of counts on the Y-axis.

The number of averages for a histogram determines the number of counts in the histogram; in other words, how many records are measured^{3/4}the records are not

"averaged". If averaging is off or if exponential averaging is selected, the measurement continues indefinitely. Keep in mind that the accuracy of the histogram is dependent on the frequency span, time-record length, and number of averages (if averaging is on).

Histograms are used for such things as determining the statistical properties of noise and monitoring the performance of electromechanical positioning systems.

PDF trace data is normalized by multiplying the number of averages by the number of points in the time record, then dividing this value by the DV spacing on the X-axis. The probability of a signal falling between two points is equal to the integral of the curve between those points.

PDF trace data displays the number of points used in its computation above the trace (Pts:). It also displays the average level (Avg:) above the trace.

See also Trace/Detector,

Key Path	Trace/Detector, Data
Mode	VSA
Help Map ID	25909
Instrument S/W Revision	A.01.60 or later

Auto Correlation

This key assigns the selected trace to display the Power Spectral Density (PSD) data result.

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 may 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.

$$R_{xx}(\tau) = \lim_{T \rightarrow \infty} \frac{1}{T} \int_{\text{conj}} [x(t)] \times x(t + \tau) dt$$

where: R_{xx} = autocorrelation function

= amount of time shift

= infinity

$x()$ = signal to be correlated

intgrl = integration

conj = conjugation

T = time

= multiplication

That is, the autocorrelation function is found by taking a signal, multiplying it by the same signal displaced (τ) 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:

$$R_{xx}(\tau) \leftrightarrow G_{xx}(f)$$

Thus,

$$\begin{aligned} R_{xx}(\tau) &= \text{IFFT} [G_{xx}(f)] \\ &= \text{IFFT} [\text{conj}(F[r \times t]) \times F(t)] \end{aligned}$$

where: I_{FFT} = Inverse FFT
conj = conjugation
 \times = multiplication
r = half size of the rectangular window
(thus the result is $\frac{1}{2}$ the original time length)

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 will 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 = $\frac{1}{2}$ width rectangular window
= multiplication

n = Average number

No Average $c = I (\text{conj} (F \{r \ t\}) F [t])$

rms Average $c = I (\text{conj} (F \{r \ t\}) F [t])$

rms Expon. Average $c = I (\text{conj} (F \{r \ t\}) F [t])$

Continuous

Peak Hold Average $c = I (\text{conj} (F \{r \ t\}) F [t])$

Average

Time Average AC [n] = I (conj (F {r AT [n] }) F (AT [n]))

where: $AT [n] = \frac{1}{n} \sum_{\text{Time}} (t [n])$

Expon. Average AC[n] = I (conj (F {r AT [n] }) F (AT [n]))

where: $AT [n] = \frac{1}{n} t [n] + \frac{n-1}{n} AT [n-1]$ and: $1 < n < \text{number of averages}$

See also Trace/Detector,

Key Path	Trace/Detector, Data
Mode	VSA
Help Map ID	25910
Instrument S/W Revision	A.01.60 or later

Format

This accesses a menu that allows you to choose the format of the selected trace. Any format may be assigned to any trace. For symbol tables and tabular data the format choice is ignored. If the data doesn't have defined symbol times, Constellation format is the same as I-Q, Eye formats are the same as Real or Imaginary, and Trellis format is the same as Unwrapped Phase.

The formats are:

Format name	Description
Log Mag (dB)	Data is converted to decibel units and shown on a linear Y axis
Linear Mag (Abs Value)	Magnitude of the data is shown on a linear Y axis
Real (I)	Real part of data is shown on a linear Y axis
Imaginary (Q)	Imaginary part of data is shown on linear Y axis
I-Q	Real part of data is shown on horizontal axis, imaginary part is shown on vertical axis, Independent variable (X axis) is normal to display
Constellation	Same as I-Q, but for data with symbols defined, only the symbol points are shown as dots with no connecting lines.
Wrap Phase	Phase of complex data, limited to ± 180 deg, is shown on Y axis

Unwrap Phase	Phase of complex data is shown "unwrapped", that is, without discontinuities. Not limited to ± 180 degrees.
I-Eye	Real part of data is shown with X axis segmented (generally into 2 symbol segments) and each segment is overlaid to show signal crossings at symbol boundaries
Q-Eye	Same as I-eye but imaginary part of data is shown
Trellis	Same as I-eye but uses unwrapped phase of data
Group Delay	Useful for frequency response displays. Shows the derivative of phase response with respect to frequency.
Log Mag (Linear Unit)	Displays data with a logarithmic Y axis, but marker read outs are in linear magnitude units.
Key Path	Trace/Detector, Format
Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4:FORMat MLOG MLINear REAL IMAGinary VECTor CONS PHASE UPHase IEYE QEYE TRELlis GDElay MLGLinear :DISPlay:<meas>:TRACe[1] 2 3 4:FORMat?
Example	DISP:DDEM:TRAC2:FORM MLIN DISP:DDEM:TRAC2:FORM?
Preset	Depends on trace and measurement
State Saved	Saved in instrument state.
Range	Log Mag (dB) Linear Mag (Abs Value) Real (I) (Lin) Imaginary (Q) (Lin) I-Q Constellation Wrap Phase Unwrap Phase I-Eye Q-Eye Trellis-Eye Group Delay Log Mag (Linear Unit)
Help Map ID	25713
Instrument S/W Revision	A.01.60 or later

Digital Demod Trace Setup

This key accesses a menu of settings that control certain elements of displays of digitally demodulated trace data.

Key Path	Trace/Detector
Mode	VSA
Help Map ID	25894

Instrument S/W Revision A.01.60 or later

Symbol Shape For all time-domain displays except IQ diagrams, Symbol Shape lets you display dots, bars, or nothing (none) at symbol locations (if the trace contains demodulated time-domain data). This key allows you to select the symbol shape for the selected trace.

If you select bars, vertical lines (bars) are drawn from the baseline to the symbol location on the trace. The baseline is 0 for all traces that have coordinates other than log (dB). The baseline is the bottom of the trace box for traces that have log (dB) coordinates.

With IQ diagrams, displaying vertical bars is meaningless. Therefore, selecting bars displays dots in IQ diagrams.

With constellation diagrams, selecting none is the same as selecting bars--you cannot turn off the dots in a constellation diagram.

Key Path	Trace/Detector, Digital Demod Trace Setup
Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4:DDEMod:SYMBol BARS DOTS OFF :DISPlay:<meas>:TRACe[1] 2 3 4:DDEMod:SYMBol?
Example	DISP:DDEM:TRAC2:DDEM:SYMB DOTS DISP:DDEM:TRAC2:DDEM:SYMB?
Preset	BARS
State Saved	Saved in instrument state.
Range	Bars Dots None
Help Map ID	25800
Instrument S/W Revision	A.01.60 or later

Ideal State Shape Digital Demodulation shows you the location of all ideal symbol states in an I-Q or constellation diagram. This key lets you choose between a cross, circle, or none to represent the ideal state on the selected trace.

Key Path	Trace/Detector, Digital Demod Trace Setup
Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4:DDEMod:SYMBol:SHAPE CIRClE CROSS OFF :DISPlay:<meas>:TRACe[1] 2 3 4:DDEMod:SYMBol:SHAPE?

Example	DISP:DDEM:TRAC2:DDEM:SYMB:SHAP CIRC DISP:DDEM:TRAC2:DDEM:SYMB:SHAP?
Preset	CIRC
State Saved	Saved in instrument state.
Range	Circle Cross None
Help Map ID	25801
Instrument S/W Revision	A.01.60 or later

Ideal State Size Determines the ideal state size, as a percentage of the maximum ideal state distance from the origin (the same way Error Vector Magnitude is defined). Ideal states are shown as circles or crosses in Vector and constellation diagrams, as determined by the Ideal State Shape setting.

The ideal state is where symbols occur if your signal is without error. Showing the ideal states gives a visual indication of the quality of your signal.

You can use this feature to determine if symbols have an EVM above a specified Value. For example, to see if any symbols have an EVM greater than 10%, set the state size to 10% and select Circle as the shape. Any symbols that fall outside of the circle (other than SYNC or PILOT symbols) have an EVM greater than 10%.

Key Path	Trace/Detector, Digital Demod Trace Setup
Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4:DDEMod:SYMBol:SIZE <real> :DISPlay:<meas>:TRACe[1] 2 3 4:DDEMod:SYMBol:SIZE?
Example	DISP:DDEM:TRAC2:DDEM:SYMB:SIZE 10 DISP:DDEM:TRAC2:DDEM:SYMB:SIZE?
Notes	Parameter is interpreted as a percent, e.g., if you want the ideal size to be 10% send 10, not 0.1
Preset	5
State Saved	Saved in instrument state.
Min	0.1
Max	50
Help Map ID	25802
Instrument S/W Revision	A.01.60 or later

Symbol Table Format This allows you to choose the format in which symbol table data is displayed, when the modulation format encodes 4 or more bits per symbol. You may choose binary or hexadecimal. Binary symbol data is padded with leading zeros to make a multiple of 4 bits before conversion to hexadecimal. For example, for 16 QAM format, each 4-bit symbol will be displayed as 2 hex digits.

Binary Format: The symbol data bit format is binary and each character represents a binary digit. The number to the left of each row indicates the bit offset of the first bit in the row.

Hexadecimal Format: The symbol data bit format is hexadecimal and each character represents a hexadecimal digit. The number to the left of each row indicate the symbol offset of the first symbol in the row.

Note

Their must be at least 4 bits/symbol to use the hexadecimal format, that is, symbols that have less than 4 bits/symbol will only be displayed in binary format regardless of the Symbol Table Format setting

This parameter is valid only when:

The active trace is a symbol table, and

The current demodulation format supports hexadecimal, the demodulation format's bits/symbol is equal to or greater than four.

Key Path	Trace/Detector, Digital Demod Trace Setup
Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4:DDEMod:SYMBol:FORMat HEXadecimal BINary :DISPlay:<meas>:TRACe[1] 2 3 4:DDEMod:SYMBol:FORMat?
Example	DISP:DDEM:TRAC2:DDEM:SYMB:FORM BIN DISP:DDEM:TRAC2:DDEM:SYMB:FORM?
Preset	HEX
Range	Hex Binary
Help Map ID	25803
Instrument S/W Revision	A.01.60 or later

Eye Length This property controls how wide (in symbol periods) the eye and trellis diagrams are, for the selected trace.

Key Path	Trace/Detector, Digital Demod Trace Setup
Mode	VSA

Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4:DDEMod:EYE:COUNT <real> :DISPlay:<meas>:TRACe[1] 2 3 4:DDEMod:EYE:COUNT?
Example	DISP:DDEM:TRAC2:DDEM:EYE:COUN 3 DISP:DDEM:TRAC2:DDEM:EYE:COUN?
Preset	2
State Saved	Saved in instrument state.
Min	0.1
Max	40
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Yes
Help Map ID	25804
Instrument S/W Revision	A.01.60 or later

Time Unit This property lets you select the time units that are applied to x-axis annotations and marker readouts for the selected trace, whenever it is assigned data with (demodulation) symbol information. The available measurement units are sym (symbols) or sec (seconds).

Key Path	Trace/Detector, Digital Demod Trace Setup
Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4:DDEMod:UNIT:TIME SEC SYMBol :DISPlay:<meas>:TRACe[1] 2 3 4:DDEMod:UNIT:TIME?
Example	DISP:VECT:TRAC2:DDEM:UNIT:TIME SYMB DISP:VECT:TRAC2:DDEM:UNIT:TIME?
Preset	SYMB
State Saved	Saved in instrument state.
Range	sym sec
Help Map ID	25805
Instrument S/W Revision	A.01.60 or later

Freq Unit This property lets you select the frequency units that are applied to x-axis annotations and marker readouts for the selected trace, whenever it is assigned data with

(demodulation) carrier information. The available measurement units are carrier or Hz.

Key Path	Trace/Detector, Digital Demod Trace Setup
Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe [1] 2 3 4 : DDEMod:UNIT:FREQuency CARRier HZ :DISPlay:<meas>:TRACe [1] 2 3 4 : DDEMod:UNIT:FREQuency?
Example	DISP:VECT:TRAC2:DDEM:UNIT:FREQ CARR DISP:VECT:TRAC2:DDEM:UNIT:FREQ?
Preset	CARR
State Saved	Saved in instrument state.
Range	carrier Hz
Help Map ID	25714
Instrument S/W Revision	A.01.60 or later

Copy to Data Register

This key accesses a menu of immediate execute keys, each of which copies the selected trace to a particular data register. Data registers can be displayed in any trace. They are measurement global, so you can copy data to a register while in the Digital Demod measurement and view it later while in the Vector measurement. Data registers are cleared when the VSA Application is exited and reentered, but not when you change Modes and return.

Key Path	Trace/Detector
Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe [1] 2 3 4 : COPY D1 D2 D3 D4 D5 D6
Example	DISP:VECT:TRAC:COPY D1
Help Map ID	25806
Instrument S/W Revision	A.01.60 or later

The following SCPI provides means to determine if a Data Register is empty, and to erase the data from any or all Data Registers.

Key Path	SCPI only
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Mode	VSA
Remote Command	:CALCulate:DATA:REGister[1] 2 3 4 5 6:EMPTY?
Example	CALC:DATA:REG2:EMPT?
Notes	Query only: returns 1 if a Data Register has no trace data assigned to it.
Help Map ID	25807
Instrument S/W Revision	A.01.60 or later

Key Path	SCPI only
Mode	VSA
Remote Command	:CALCulate:DATA:REGister[1] 2 3 4 5 6:REMOve
Example	CALC:DATA:REG2:REM
Notes	Removes trace data assigned to specified Data Register.
Dependencies/Couplings	If Data Register is assigned to a trace, the trace data is changed to No Data
Help Map ID	25808
Instrument S/W Revision	A.01.60 or later

Key Path	SCPI only
Mode	VSA
Remote Command	:CALCulate:DATA:REGister:ALL:REMOve
Example	CALC:DATA:REG:ALL:REM
Notes	Removes trace data assigned to all Data Registers.
Dependencies/Couplings	If Data Register is assigned to a trace, the trace data is changed to No Data
Help Map ID	25809
Instrument S/W Revision	A.01.60 or later

Phase/Delay Properties

This key accesses a menu of properties that affect the selected trace when displayed using phase or delay formats

Key Path	Trace/Detector
Mode	VSA
Help Map ID	25895

Instrument S/W Revision A.01.60 or later

Phase/Trellis Offset This is only used if the trace Format is Wrap Phase, Unwrap Phase or Trellis. For Unwrap Phase or Trellis displays, the phase offset value is added to the existing phase at each point. For example, If you are viewing an Unwrapped Phase trace, setting the Phase/Trellis Offset to 5 degrees moves the entire trace up 5 degrees (and changes the value displayed by a marker by the same amount). For Wrap Phase displays the phase offset only affects the phase wrap point, not the underlying data. The point at which the phase wraps is 180 degrees plus the phase offset. For example, suppose you have a marker on a Wrap Phase display whose phase offset is 0 and the marker is showing -3 degrees. The trace data will all be confined within (-180, 180] degrees. If you then change the phase offset to 180 degrees, then the Wrap Phase display will show values within the interval (0, 360] degrees and the marker value will be displayed as 357 degrees, which is the wrapped equivalent of -3 degrees.

Key Path	Trace/Detector, Phase Delay Properties
Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4:FORMat:PHASe:OFFSet <real> :DISPlay:<meas>:TRACe[1] 2 3 4:FORMat:PHASe:OFFSet?
Example	DISP:DDEM:TRAC3:FORM:PHAS:OFFS 31 DISP:DDEM:TRAC3:FORM:PHAS:OFFS?
Preset	0
State Saved	Saved in instrument state.
Min	-1E+8
Max	1E+8
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Yes
Help Map ID	25810
Instrument S/W Revision	A.01.60 or later

Unwrap Phase Ref Unwrapped phase lets you designate the point (x-axis) value about which phase values are to be unwrapped. That is, the phase at the designated reference will be within -180 to 180 degrees, and phase will vary smoothly without jumps around that point.

Key Path	Trace/Detector, Phase Delay Properties
Mode	VSA

Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4:FORMat:PHASe:UNWRap:REFe rence <real> :DISPlay:<meas>:TRACe[1] 2 3 4:FORMat:PHASe:UNWRap:REFe rence?
Example	DISP:DDEM:TRAC3:FORM:PHAS:UNWR:REF 24.5E6 DISP:DDEM:TRAC3:FORM:PHAS:UNWR:REF?
Preset	0
State Saved	Saved in instrument state.
Min	-9.9e37
Max	9.9e37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25811
Instrument S/W Revision	A.01.60 or later

Group Delay Aperture The value of Delay Aperture is used when the trace format is Group Delay. The aperture is specified as a percentage of the current frequency span for frequency-domain data. It is specified as a percentage of the time-record length for time-domain data.

When group delay is calculated for a given point (which can be a time- or frequency-domain point), the aperture is centered at that point. Larger apertures decrease resolution, but they increase the smoothing of the group-delay trace.

The point plotted for group delay is located between the data points used to calculate it. For example, in the frequency domain, the group delay for 100 Hz may be calculated by measuring the change in phase between 90 and 110 Hz. If you had specified a start frequency of 90 Hz, 100 Hz would be the first point with group delay data. This results in a trace that does not extend to the edges of the screen (more noticeable as the delay aperture increases).

Note that the smallest aperture that you can select depends on the number of frequency points. If you select an invalid aperture, the analyzer automatically selects the smallest valid aperture.

Key Path	Trace/Detector, Phase Delay Properties
Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk

Remote Command	:DISPlay:<meas>:TRACe[1] 2 3 4:FORMat:DELay:APERture <real> :DISPlay:<meas>:TRACe[1] 2 3 4:FORMat:DELay:APERture?
Example	DISP:DDEM:TRAC3:FORM:DEL:APER 1 DISP:DDEM:TRAC3:FORM:DEL:APER?
Notes	Parameter is interpreted as a percent, e.g., if you want the group delay aperture to be 1% send 1, not 0.01
Preset	0.5
State Saved	Saved in instrument state.
Min	0.00390625
Max	16
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Yes
Help Map ID	25812
Instrument S/W Revision	A.01.60 or later

Register

Accesses a menu that allows you to select registers for assignment of trace data.

Key Path	Trace/Detector, Data
Mode	VSA
Help Map ID	25923
Instrument S/W Revision	A.01.60 or later

Data 1 Select register 1 for assignment of trace data.

Key Path	Trace/Detector, Data, Register
Mode	VSA
Help Map ID	25924
Instrument S/W Revision	A.01.60 or later

Data 2 Selects register 1 for assignment of trace data.

Key Path	Trace/Detector, Data, Register
Mode	VSA
Help Map ID	25925

Instrument S/W Revision A.01.60 or later

Data 3 Selects register 1 for assignment of trace data.

Key Path	Trace/Detector, Data, Register
Mode	VSA
Help Map ID	25926
Instrument S/W Revision	A.01.60 or later

Data 4 Selects register 1 for assignment of trace data.

Key Path	Trace/Detector, Data, Register
Mode	VSA
Help Map ID	25927
Instrument S/W Revision	A.01.60 or later

Data 5 Selects register 5 for assignment of trace data.

Key Path	Trace/Detector, Data, Register
Mode	VSA
Help Map ID	25928
Instrument S/W Revision	A.01.60 or later

Data 6 Selects register 6 for assignment of trace data.

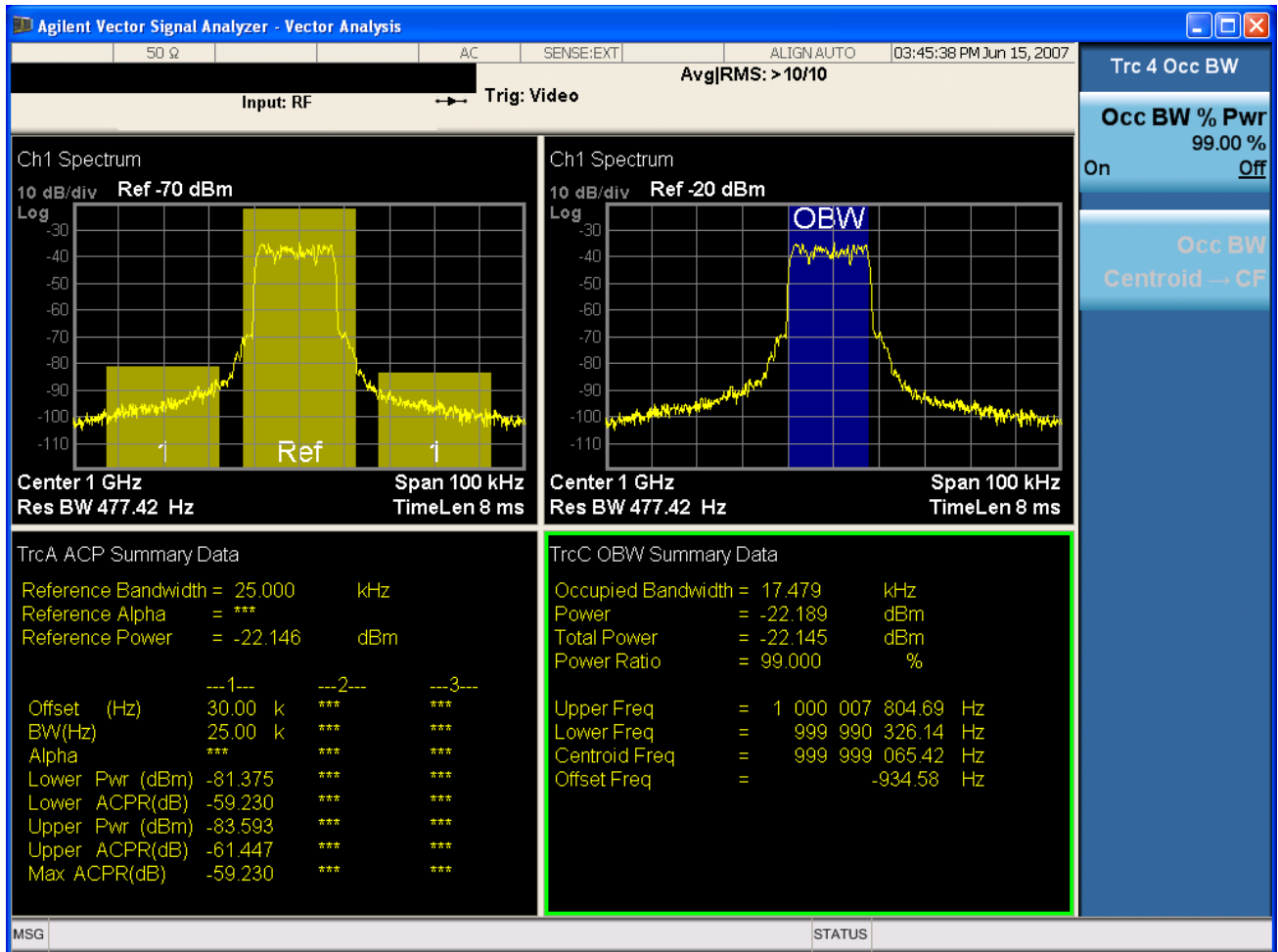
Key Path	Trace/Detector, Data, Register
Mode	VSA
Help Map ID	25929
Instrument S/W Revision	A.01.60 or later

ACP Setup

The adjacent channel power (ACP) function calculates the power in a reference band of frequencies as well as bands of frequencies offset from the reference, and calculates the ratio of each offset band to the reference band power.

The ACP key accesses a menu of functions that allow you to define and turn on the ACP function on the selected trace. One reference channel and up to 5 offset frequencies may be defined, and ACP will be calculated for bands both above and below the reference frequency for each offset.

An ACP measurement may be defined for each trace, although it will only be active on frequency-domain trace data. The reference and offset frequency bands defined by the ACP measurement are shown as gold bars overlaying the trace display. To see tabular data showing power and power ratio results, you may assign the ACP Summary (Trace n) to a different trace. For example, you can assign Spectrum data to trace 1, turn on and define an ACP measurement on trace 1, assign the ACP Summary (Trace 1) to trace 2, and use a 2x2 display to view both at the same time, as shown below



The summary data may be retrieved programmatically using `FETCH?` or the `CALCulate:<meas>:DATA:TABLE` commands. See the Data Queries section under Common Functions for more details.

Key Path	Trace/Detector
Mode	VSA
Help Map ID	25813
Instrument S/W Revision	A.01.60 or later

ACP Summary for Trace 1

Select trace for assignment of ACP Data.

See also ACP Setup

Key Path	Trace/Detector, Data, ACP, Channel n
Mode	VSA
Help Map ID	25911
Instrument S/W Revision	A.01.60 or later

ACP Summary for Trace 2

Select trace for assignment of ACP Data.

See also ACP Setup

Key Path	Trace/Detector, Data, ACP, Channel n
Mode	VSA
Help Map ID	25912
Instrument S/W Revision	A.01.60 or later

ACP Summary for Trace 3

Select trace for assignment of ACP Data.

See also ACP Setup

Key Path	Trace/Detector, Data, ACP, Channel n
Mode	VSA
Help Map ID	25913
Instrument S/W Revision	A.01.60 or later

ACP Summary for Trace 4

Select trace for assignment of ACP Data.

See also ACP Setup

Key Path	Trace/Detector, Data, ACP, Channel n
Mode	VSA
Help Map ID	25914
Instrument S/W Revision	A.01.60 or later

ACP On/Off

This softkey turns the ACP function on or off for the selected trace

Key Path	Trace/Detector, ACP
Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:TRACe[1] 2 3 4:ACPpower:STATe OFF ON 0 1 :CALCulate:<meas>:TRACe[1] 2 3 4:ACPpower:STATe?
Example	CALC:VECT:TRAC1:ACP:STATE ON CALC:VECT:TRAC1:ACP:STATE?
Preset	0
State Saved	Saved in instrument state.
Help Map ID	25814
Instrument S/W Revision	A.01.60 or later

Carrier Freq

This key allows you to enter the carrier frequency of the reference channel for the ACP measurement. The carrier frequency is relative to the center frequency of the measurement. There is only one available reference carrier.

Key Path	Trace/Detector, ACP
Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:TRACe[1] 2 3 4:ACPpower:CARRier:FREQue ncy <freq> :CALCulate:<meas>:TRACe[1] 2 3 4:ACPpower:CARRier:FREQue ncy?
Example	CALC:VECT:TRAC1:ACP:CARR:FREQ 100 KHZ CALC:VECT:TRAC1:ACP:CARR:FREQ?
Preset	0
State Saved	Saved in instrument state.
Min	-9.9e37
Max	9.9e37
Test MIN/MAX/DEF	No

Test UP/DOWN	No
Help Map ID	25815
Instrument S/W Revision	A.01.60 or later

Carrier Meas Noise BW

This key allows you to define the measurement noise bandwidth of the reference channel.

Key Path	Trace/Detector, ACP
Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:TRACe[1] 2 3 4:ACPowEr:CARRier:BANDwidth BWIDth:INTEgration <bandwidth> :CALCulate:<meas>:TRACe[1] 2 3 4:ACPowEr:CARRier:BANDwidth BWIDth:INTEgration?
Example	CALC:VECT:TRAC1:ACP:CARR:BAND:INT 1 MHZ CALC:VECT:TRAC1:ACP:CARR:BAND:INT?
Preset	1000000
State Saved	Saved in instrument state.
Min	-9.9e37
Max	9.9e37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25816
Instrument S/W Revision	A.01.60 or later

Carrier RRC Weighting

This key turns on or off RRC weighting for the reference (carrier) power measurement.

Key Path	Trace/Detector, ACP
Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:TRACe[1] 2 3 4:ACPowEr:CARRier:FILTer:RRC:STATe OFF ON 0 1 :CALCulate:<meas>:TRACe[1] 2 3 4:ACPowEr:CARRier:FILTer:RRC:STATe?

Example	CALC:VECT:TRAC1:ACP:CARR:FILT:RRC:STAT ON CALC:VECT:TRAC1:ACP:CARR:FILT:RRC:STAT?
Preset	0
State Saved	Saved in instrument state.
Help Map ID	25817
Instrument S/W Revision	A.01.60 or later

Carrier Filter Alpha

This key allows you to adjust the alpha of the RRC filter for the reference (carrier) power measurement.

Key Path	Trace/Detector, ACP
Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:TRACe[1] 2 3 4:ACPpower:CARRier:FILTer :RRC:ALPHa <real> :CALCulate:<meas>:TRACe[1] 2 3 4:ACPpower:CARRier:FILTer :RRC:ALPHa?
Example	CALC:VECT:TRAC1:ACP:CARR:FILT:RRC:ALPH 0.22 CALC:VECT:TRAC1:ACP:CARR:FILT:RRC:ALPH?
Preset	0.35
State Saved	Saved in instrument state.
Min	0
Max	1
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25818
Instrument S/W Revision	A.01.60 or later

Offsets

The ACP measurement compares power in frequency bands offset from the carrier to power in the reference channel (centered on the carrier). Up to 5 offsets may be defined. The offsets are designated by letters A through E. Each offset is defined by an offset frequency, bandwidth, and optional RRC weighting. An offset actually defines two bands, one above the reference frequency and one below. Each band is used individually in the ACP calculation. RRC weighting may only be turned on or off for all offsets, but each offset

may have its own RRC filter alpha. A filter alpha of 0 is the same as no RRC weighting.

The Offsets key accesses a menu that has a key for each offset, and also an Offset RRC weighting on/off key. Each offset key shows a summary of its current parameters. Pressing one of the Offset A | B | C | D | E keys accesses a menu for adjusting its parameters

Key Path	Trace/Detector,ACP,Offsets
Mode	VSA
Help Map ID	25819
Instrument S/W Revision	A.01.60 or later

Offset Freq Offset Meas Noise BW This key allows you to set the measurement noise bandwidth for the power measurement of a selected offset band.

Key Path	Trace/Detector,ACP,Offsets,Offset A B C D E
Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:TRACe[1] 2 3 4:ACPpower:OFFSet:LIST:BA NDwidth BWIDth:INTEgration <bandwidth>, ... :CALCulate:<meas>:TRACe[1] 2 3 4:ACPpower:OFFSet:LIST:BA NDwidth BWIDth:INTEgration?
Example	CALC:VECT:TRAC1:ACP:OFFS:LIST:BAND:INT 1 MHZ,2 MHZ,3 MHZ,4 MHZ,5 MHZ CALC:VECT:TRAC1:ACP:OFFS:LIST:BAND:INT?
Notes	If you send fewer than 5 bandwidth parameters in the list, then Measurement Noise Bandwidths for the remaining Offsets are set to 0.
Preset	1000000,0,0,0,0
State Saved	Saved in instrument state.
Min	-9.9e37
Max	9.9e37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25821
Instrument S/W Revision	A.01.60 or later

Offset Filter Alpha This key allows you to adjust the alpha of the RRC filter for the power

measurement of the selected offset band.

Key Path	Trace/Detector,ACP,Offsets,Offset A B C D E
Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:TRACe[1] 2 3 4:ACPpower:OFFSet:LIST:FI LTer:RRC:ALPHA <real>, ... :CALCulate:<meas>:TRACe[1] 2 3 4:ACPpower:OFFSet:LIST:FI LTer:RRC:ALPHA?
Example	CALC:VECT:TRAC1:ACP:OFFS:LIST:FILT:RRC:ALPH 0.22,0.22,0.22,0.22,0.22 CALC:VECT:TRAC1:ACP:OFFS:LIST:FILT:RRC:ALPH?
Notes	You may send a single Filter Alpha for Offset A, or a comma-separated list of up to 5 Filter Alpha parameters. These are assigned in sequence to the Offsets. Alpha for any remaining Offsets will be set to 0.
Preset	0.35,0.35,0.35,0.35,0.35
State Saved	Saved in instrument state.
Min	0
Max	1.0
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25822
Instrument S/W Revision	A.01.60 or later

RRC Weighting (All Offsets) This key turns on or off RRC weighting for the power measurement for all offsets. If RRC weighting is turned on, but you wish to exclude RRC weighting for a particular offset, set its filter alpha to 0.

Key Path	Trace/Detector,ACP,Offsets
Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:TRACe[1] 2 3 4:ACPpower:OFFSet:FILTer: RRC:STATE OFF ON 0 1 :CALCulate:<meas>:TRACe[1] 2 3 4:ACPpower:OFFSet:FILTer: RRC:STATE?

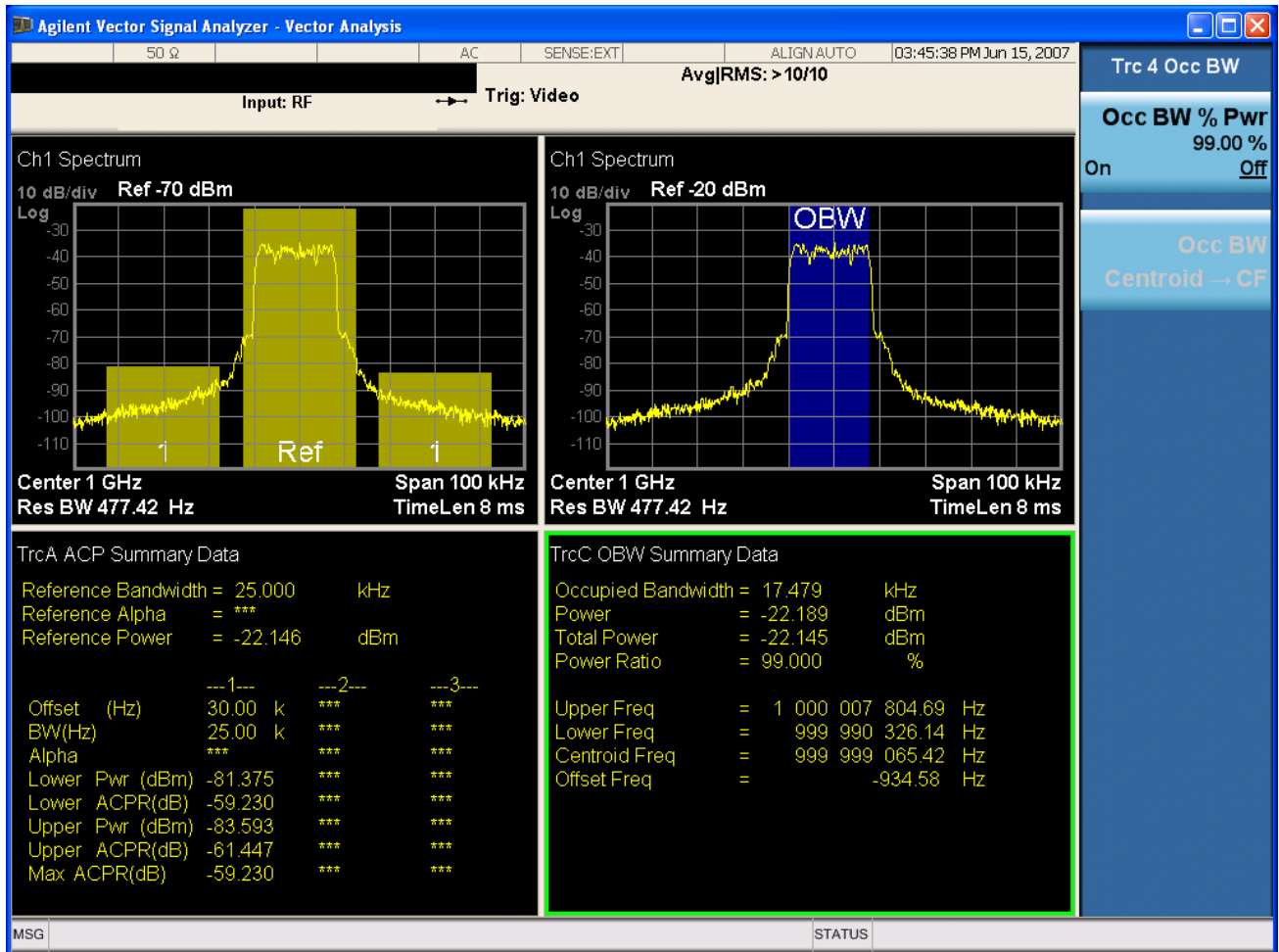
Example	CALC:VECT:TRAC1:ACP:OFFS:FILT:RRC:STAT ON CALC:VECT:TRAC1:ACP:OFFS:FILT:RRC:STAT?
Preset	0
State Saved	Saved in instrument state.
Help Map ID	25824
Instrument S/W Revision	A.01.60 or later

OBW Setup (Occupied Bandwidth)

The occupied bandwidth (OBW) function finds and displays the band of frequencies that contain a specified percentage of the total power within the measurement span.

The OBW key accesses a menu of functions that allow you to define and turn on the OBW function on the selected trace.

An OBW measurement may be defined for each trace, although it will only be active on frequency-domain trace data. The band defined by the OBW measurement is shown as a blue bar overlaying the trace display. To see tabular data showing the frequencies of the band limits, the total power, etc. you may assign the OBW Summary (Trace n) to a different trace. For example, you can assign Spectrum data to trace 3, turn on OBW on trace 3, and assign the OBW Summary (Trace 3) to trace 4, as shown below.



The summary data may be retrieved programmatically using `FETCh?` or the `CALCulate:<meas>:DATA:TABLE` commands. See the Data Queries section under Common Functions for more details.

Key Path	Trace/Detector
Mode	VSA
Help Map ID	25825
Instrument S/W Revision	A.01.60 or later

OBW Summary for Trace 1

Select trace for assignment of OBW Data.

See also: OBW Setup (Occupied Bandwidth)

Key Path	Trace/Detector, Data, OBW, Channel n
Mode	VSA

Help Map ID 25917
Instrument S/W Revision A.01.60 or later

OBW Summary for Trace 2

Select trace for assignment of OBW Data

See also: OBW Setup (Occupied Bandwidth).

Key Path **Trace/Detector, Data, OBW, Channel n**
Mode VSA
Help Map ID 25918
Instrument S/W Revision A.01.60 or later

OBW Summary for Trace 3

Select trace for assignment of OBW Data

See also: OBW Setup (Occupied Bandwidth).

Key Path **Trace/Detector, Data, OBW, Channel n**
Mode VSA
Help Map ID 25919
Instrument S/W Revision A.01.60 or later

OBW Summary for Trace 4

Select trace for assignment of OBW Data

See also: OBW Setup (Occupied Bandwidth).

Key Path **Trace/Detector, Data, OBW, Channel n**
Mode VSA
Help Map ID 25920
Instrument S/W Revision A.01.60 or later

OBW Power

The OBW Power key is used to specify the percentage of power used to determine the occupied BW, and to turn the OBW function on or off for the selected trace.

Key Path **Trace/Detector, OBW**
Mode VSA

Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:TRACe[1] 2 3 4:OBWidth:PERCent <real> :CALCulate:<meas>:TRACe[1] 2 3 4:OBWidth:PERCent? :CALCulate:<meas>:TRACe[1] 2 3 4:OBWidth:STATe OFF ON 0 1 :CALCulate:<meas>:TRACe[1] 2 3 4:OBWidth:STATe?
Example	CALC:VECT:TRAC1:OBW:PERC 99 CALC:VECT:TRAC1:OBW:PERC? CALC:VECT:TRAC1:OBW:STAT ON CALC:VECT:TRAC1:OBW:STAT?
Notes	Parameter is interpreted as a percent, e.g., if you want the OBW to be 95% send 95, not 0.95
Dependencies/Couplings	None Controls the presence or absence of data in the OBW Summary table for the selected trace
Preset	99.0 0
State Saved	Saved in instrument state.
Min	0
Max	100
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25780
Instrument S/W Revision	A.01.60 or later

OBW Centroid > CF

This softkey is used to copy the centroid of the occupied bandwidth to the Center Frequency. It only works if the currently selected trace has data compatible with the OBW function, and OBW is turned on.

This is a front-panel function only.

You can read the OBW centroid using the following SCPI-only query and use the result to set the center frequency.

Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk

Remote Command	:CALCulate:<meas>:TRACe[1] 2 3 4:OBWidth:CENTroid?
Example	CALC:VECT:TRAC1:OBW:CENT?
Notes	Query only. Returns NaN (9.91E+37) if the OBW function is not active for the selected trace, or is not supported for the trace data assigned to the selected trace.
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

BW Limit

This turns on or off limit testing for the Occupied BW test for the selected trace, and allows you to define the limit. Test pass or fail status appears in the OBW Summary table associated with the trace.

Key Path	Trace/Detector, OBW
Mode	VSA
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B IPOWer IDEMod MOTotalk

Remote Command	:CALCulate:<meas>:TRACe[1] 2 3 4:OBWidth:LIMit:FBLimit <freq>
	:CALCulate:<meas>:TRACe[1] 2 3 4:OBWidth:LIMit:FBLimit?
	:CALCulate:<meas>:TRACe[1] 2 3 4:OBWidth:LIMit[:TEST] OFF ON 0 1
	:CALCulate:<meas>:TRACe[1] 2 3 4:OBWidth:LIMit[:TEST]?

Example	CALC:VECT:TRAC1:OBW:LIMIT:FBL 10 MHZ CALC:VECT:TRAC1:OBW:LIMIT:FBL? CALC:VECT:TRAC1:OBW:LIMIT:TEST ON CALC:VECT:TRAC1:OBW:LIMIT:TEST?
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Preset	1000000 0
State Saved	Saved in instrument state.
Min	1 Hz
Max	9.9e37 (Infinity) Hz
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25826
Instrument S/W Revision	A.01.60 or later

Trace Indicator Info

This softkey allows you to get more information about why a trace indicator is showing. A trace indicator appears in the upper right corner of a trace display to announce exceptional conditions. When such an indicator is showing on the selected trace, pressing this key causes more information about the condition to appear in the message area. This is a front-panel only function. The SCPI commands for querying the Trace Indicator and the Trace Indicator Info for a particular trace are:

```
CALC:<meas>:DATA[1] | 2 | 3 | 4:HEAD:STR? "TrcLedStr"
```

```
CALC:<meas>:DATA[1] | 2 | 3 | 4:HEAD:STR? "TrcLedReason"
```

Key Path	Trace/Detector
Mode	VSA
Help Map ID	25896
Instrument S/W Revision	A.01.60 or later

Trigger

Triggering is used to determine when a measurement should start taking data. There are several available trigger sources. For each trigger source, there are associated setup parameters. Typically, a trigger event is generated when a signal (or a characteristic of the signal) crosses a defined trigger level (or threshold) on a rising or falling slope. The measurement begins at a specified time delay from the trigger point. The delay may be negative, allowing pre-trigger data to be taken. Each trigger source has associated its own trigger level, slope, and delay settings.

Trigger Holdoff - Some form of trigger holdoff is available for most trigger types. Hold off can be defined in different ways, with possible variations depending on trigger slope setting.

Normal: This is the holdoff type that scopes typically use. After a trigger event, for the duration of the holdoff time, no additional trigger events are recognized.

Below Level: If the trigger slope is positive, a trigger event is generated only if the signal characteristic of interest crosses the trigger threshold (with positive slope) after having been below the threshold for at least the holdoff time. For negative slope, the trigger event is generated if the signal characteristic crosses the threshold (with negative slope) and then remains below the threshold for at least the holdoff time. In either case, the trigger event is associated with the time the level was crossed.

Above Level: If the trigger slope is positive, a trigger event is generated only if the signal characteristic of interest crosses the trigger threshold (with positive slope) and then remains above the threshold for at least the holdoff time. For negative slope, the trigger event is generated if the signal characteristic crosses the threshold (with negative slope) after having been above the threshold for at least the holdoff time. In either case, the trigger event is associated with the time the level was crossed.

Key Path	Front Panel
Mode	VSA, LTE
Help Map ID	25897
Instrument S/W Revision	A.01.60 or later

Trig Reference Line

The trigger reference line appears (if enabled) when the trigger source is related to the measured signal. It shows the trigger level relative to the signal. This control allows you to show or hide the trigger reference line.

The trigger reference line, only appears on appropriately formatted time traces. For example, if Video (IF Envelope) trigger is selected, the trigger level line would appear on Main Time, Inst Main Time, or Raw Main Time traces that are formatted as Log Mag or

Linear Mag.

Key Path	Trigger
Mode	VSA, LTE
Remote Command	:TRIGger[:SEQuence]:RLINe OFF ON 0 1 :TRIGger[:SEQuence]:RLINe?
Example	TRIG:RLIN ON TRIG:RLIN?
Preset	1
State Saved	Saved in instrument state.
Range	Show Hide
Help Map ID	25827
Instrument S/W Revision	A.01.60 or later

Hardware Trigger

When the Data Source is Inputs, this trigger menu appears. The menu gives you a choice of trigger sources. Once you select a trigger source, you can branch to the setup parameters for that source.

Key Path	Trigger
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:TRIGger:<meas>[:SEQuence]:SOURce IMMediate VIDeo EXTernal1 :TRIGger:<meas>[:SEQuence]:SOURce?
Example	TRIG:VECT:SOUR IMM TRIG:VECT:SOUR?
Notes	Video triggering is also known by some as IF Envelope or IF Magnitude triggering.
Preset	IMM
State Saved	Saved in instrument state.
Range	Free Run Video (IF Envelope) External 1
Help Map ID	25828
Instrument S/W Revision	A.01.60 or later

Free Run

Free Run triggering, means each measurement scan starts as soon as possible, without regard to any signal characteristics or external triggering signal.

Key Path	Trigger
Mode	VSA, LTE
Help Map ID	25829
Instrument S/W Revision	A.01.60 or later

Video (IF Envelope)

Pressing this key, when it is not selected, selects Video (IF Envelope) triggering. The trigger condition is met when the magnitude of the signal you are measuring crosses the defined trigger level while satisfying the slope and holdoff conditions. (Specifically, the source for the trigger calculation is the IF signal, filtered only by the brickwall filter that defines the information bandwidth of the signal, Signal energy outside the information bandwidth does not affect the triggering.)

Note: This is called Video triggering due to its similarity with swept analyzer zero span measurements being triggered on the video signal. However, in this case there is no video signal. Since the trigger condition applies to the full IF signal, this is also called IF envelope triggering.

If Video triggering is already selected then pressing this softkey accesses the video trigger setup functions, and changes the active function to Video Trigger Level.

Key Path	Trigger
Mode	VSA, LTE
Help Map ID	25830
Instrument S/W Revision	A.01.60 or later

Trigger Level Sets a level (in volts) that the magnitude of the IF signal must cross (with the correct slope) in order to generate a trigger. (Holdoff conditions must also be met.)

Key Path	Trigger,Video
Mode	VSA, LTE
Remote Command	:TRIGger[:SEquence]:VIDeo:LEVel <voltage> :TRIGger[:SEquence]:VIDeo:LEVel?
Example	TRIG:VID:LEV 10 MV TRIG:VID:LEV?
Notes	:TRIGger[:SEquence]:IF:LEVel <voltage> may be used as an alias
Preset	10 mV

State Saved	Saved in instrument state.
Min	0
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25831
Instrument S/W Revision	A.01.60 or later

Trig Slope Controls the trigger polarity. Positive means the trigger occurs when the rising magnitude crosses the trigger level. Negative means the trigger occurs when the falling magnitude crosses the trigger level.

Key Path	Trigger,Video
Mode	VSA, LTE
Remote Command	:TRIGger[:SEquence]:VIDeo:SLOPe POSitive NEGative :TRIGger[:SEquence]:VIDeo:SLOPe?
Example	TRIG:VID:SLOP POS TRIG:VID:SLOP?
Notes	:TRIGger[:SEquence]:IF:SLOPe POSitive NEGative may also be used
Preset	POS
State Saved	Saved in instrument state.
Range	Pos Neg
Help Map ID	25832
Instrument S/W Revision	A.01.60 or later

Trig Delay

Trig Holdoff Sets the trigger holdoff time.

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Key Path	Trigger,Video
Mode	VSA, LTE

Remote Command	:TRIGger[:SEquence]:VIDeo:HOLDoff <time> :TRIGger[:SEquence]:VIDeo:HOLDoff? :TRIGger[:SEquence]:VIDeo:HOLDoff:STATe OFF ON 0 1 :TRIGger[:SEquence]:VIDeo:HOLDoff:STATe?
Example	TRIG:VID:HOLD 1 US TRIG:VID:HOLD? TRIG:VID:HOLD:STAT ON TRIG:VID:HOLD:STAT?
Notes	:TRIGger[:SEquence]:IF:HOLDoff may be used as an alias :TRIGger[:SEquence]:IF:HOLDoff:STATe may be used as an alias
Preset	0 OFF
State Saved	Saved in instrument state.
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25834
Instrument S/W Revision	A.01.60 or later

Holdoff Type Sets the trigger holdoff type.

Some form of trigger holdoff is available for most trigger types. Hold off can be defined in different ways, with possible variations depending on trigger slope setting.

Below Level: If the trigger slope is positive, a trigger event is generated only if the signal characteristic of interest crosses the trigger threshold (with positive slope) after having been below the threshold for at least the holdoff time. For negative slope, the trigger event is generated if the signal characteristic crosses the threshold (with negative slope) and then remains below the threshold for at least the holdoff time. In either case, the trigger event is associated with the time the level was crossed.

Above Level: If the trigger slope is positive, a trigger event is generated only if the signal characteristic of interest crosses the trigger threshold (with positive slope) and then remains above the threshold for at least the holdoff time. For negative slope, the trigger event is generated if the signal characteristic crosses the threshold (with negative slope) after having been above the threshold for at least the holdoff time. In either case, the trigger event is associated with the time the level was crossed.

Key Path **Trigger,Video**

Mode	VSA
Remote Command	:TRIGger[:SEquence]:VIDeo:HOLDoFF:TYPE BELow ABOve :TRIGger[:SEquence]:VIDeo:HOLDoFF:TYPE?
Example	TRIG:VID:HOLD:TYPE BEL TRIG:VID:HOLD:TYPE?
Notes	:TRIGger[:SEquence]:IF:HOLDoFF:TYPE can be used as an alias
Preset	BEL
State Saved	Saved in instrument state.
Range	Below Level Above Level
Help Map ID	25835
Instrument S/W Revision	A.01.60 or later

External 1 Pressing this key, when it is not selected, selects the signal on the Trigger 1 input as the trigger signal. The trigger condition is met when the level of the external trigger signal crosses the defined trigger level while satisfying the slope and holdoff conditions.

Note that currently, the VSA based measurements do not support External 2 triggering.

If External 1 triggering is already selected then pressing this softkey accesses the external 1 trigger setup functions, and changes the active function to Ext 1 Trigger Level.

Key Path	Trigger
Mode	VSA, LTE
Help Map ID	25836
Instrument S/W Revision	A.01.60 or later

Trigger Level Sets a level (in volts) that the Trigger signal must cross (with the correct slope) in order to generate a trigger. (Holdoff conditions must also be met.)

Key Path	Trigger, External 1
Mode	VSA, LTE
Remote Command	:TRIGger[:SEquence]:EXTernal1:LEVel <voltage> :TRIGger[:SEquence]:EXTernal1:LEVel?
Example	TRIG:EXT1:LEV 10 MV TRIG:EXT1:LEV?
Preset	1 V
State Saved	Saved in instrument state.

Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25837
Instrument S/W Revision	A.01.60 or later

Trig Slope Controls the trigger polarity. Positive means the trigger occurs on a rising edge. Negative means the trigger occurs on a falling edge.

Key Path	Trigger, External 1
Mode	VSA, LTE
Remote Command	:TRIGger[:SEquence]:EXTernal1:SLOPe Positive NEGative :TRIGger[:SEquence]:EXTernal1:SLOPe?
Example	TRIG:EXT1:SLOP POS TRIG:EXT1:SLOP?
Preset	POS
State Saved	Saved in instrument state.
Range	Pos Neg
Help Map ID	25838
Instrument S/W Revision	A.01.60 or later

Trig Delay Controls the time delay from the trigger point to the actual start of the measurement data. This can be negative to get pre-trigger data.

Key Path	Trigger, External 1
Mode	VSA, LTE
Remote Command	:TRIGger[:SEquence]:EXTernal1:DELAy <time> :TRIGger[:SEquence]:EXTernal1:DELAy? :TRIGger[:SEquence]:EXTernal1:DELAy:STATe OFF ON 0 1 :TRIGger[:SEquence]:EXTernal1:DELAy:STATe?
Example	TRIG:EXT1:DEL 10 MS TRIG:EXT1:DEL? TRIG:EXT1:DEL:STAT ON TRIG:EXT1:DEL:STAT?

Preset	0
	0
State Saved	Saved in instrument state.
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25839
Instrument S/W Revision	A.01.60 or later

Trig Holdoff Sets the trigger holdoff time.

Key Path	Trigger, External 1
Mode	VSA, LTE
Remote Command	:TRIGger[:SEQuence]:EXTernal1:HOLDoff <time> :TRIGger[:SEQuence]:EXTernal1:HOLDoff? :TRIGger[:SEQuence]:EXTernal1:HOLDoff:STATe OFF ON 0 1 :TRIGger[:SEQuence]:EXTernal1:HOLDoff:STATe?
Example	TRIG:EXT1:HOLD 1 US TRIG:EXT1:HOLD? TRIG:EXT1:HOLD:STAT ON TRIG:EXT1:HOLD:STAT?
Preset	0
	0
State Saved	Saved in instrument state.
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Help Map ID	25840
Instrument S/W Revision	A.01.60 or later

Holdoff Type Sets the trigger holdoff type. See

Some form of trigger holdoff is available for most trigger types. Hold off can be defined in different

ways, with possible variations depending on trigger slope setting.

Below Level: If the trigger slope is positive, a trigger event is generated only if the signal characteristic of interest crosses the trigger threshold (with positive slope) after having been below the threshold for at least the holdoff time. For negative slope, the trigger event is generated if the signal characteristic crosses the threshold (with negative slope) and then remains below the threshold for at least the holdoff time. In either case, the trigger event is associated with the time the level was crossed.

Above Level: If the trigger slope is positive, a trigger event is generated only if the signal characteristic of interest crosses the trigger threshold (with positive slope) and then remains above the threshold for at least the holdoff time. For negative slope, the trigger event is generated if the signal characteristic crosses the threshold (with negative slope) after having been above the threshold for at least the holdoff time. In either case, the trigger event is associated with the time the level was crossed.

Key Path	Trigger, External 1
Mode	VSA, LTE
Remote Command	:TRIGger[:SEquence]:EXTernal1:HOLDoff:TYPE BELow ABOVE :TRIGger[:SEquence]:EXTernal1:HOLDoff:TYPE?
Example	TRIG:EXT1:HOLD:TYPE BEL TRIG:EXT1:HOLD:TYPE?
Preset	BEL
State Saved	Saved in instrument state.
Range	Below Level Above Level
Help Map ID	25841
Instrument S/W Revision	A.01.60 or later

Free Run Selecting this trigger source means the measurement immediately begins taking data starting at the next available point in the recording.

Key Path	Trigger, Playback Trigger
Mode	VSA, LTE
Help Map ID	30180
Instrument S/W Revision	A.01.60 or later

IF Envelope Pressing this key, when it is not selected, selects IF Envelope triggering. The trigger condition is met when the calculated magnitude of the data in the recording. (i.e., the absolute value of real data, or the vector magnitude of complex data) crosses the defined trigger level while satisfying the slope and holdoff conditions.. There is no filtering or smoothing of the magnitude data.

Note: Although analysis of recorded data allows you to chose a different span and center frequency within the bandwidth limits of the original recording, the original bandwidth of

the recorded data is used for trigger calculations,

If IF Envelope triggering is already selected then pressing this softkey accesses the IF Envelope trigger setup functions, and changes the active function to IF Envelope Trigger Level.

Key Path	Trigger
Mode	VSA, LTE
Help Map ID	25843
Instrument S/W Revision	A.01.60 or later

Trigger Level Sets a level (in volts) that the magnitude of the IF signal must cross (with the correct slope) in order to generate a trigger. (Holdoff conditions must also be met.)

Key Path	Trigger, IF Envelope
Mode	VSA, LTE
Remote Command	:TRIGger[:SEQuence]:RECOrding:VIDeo:LEVel <voltage> :TRIGger[:SEQuence]:RECOrding:VIDeo:LEVel?
Example	TRIG:REC:VID:LEV 10 MV TRIG:REC:VID:LEV?
Notes	:TRIGger[:SEQuence]:RECOrding:IF:LEVel <voltage> may be used as an alias
Preset	1 V
State Saved	Saved in instrument state.
Min	0
Max	9.9E+37
Help Map ID	25844
Instrument S/W Revision	A.01.60 or later

Trig Slope Controls the trigger polarity. Positive means the trigger occurs when the rising magnitude crosses the trigger level. Negative means the trigger occurs when the falling magnitude crosses the trigger level.

Key Path	Trigger,Video
Mode	VSA, LTE
Remote Command	:TRIGger[:SEQuence]:RECOrding:VIDeo:SLOPe POSitive NEGative :TRIGger[:SEQuence]:RECOrding:VIDeo:SLOPe?

Example	TRIG:REC:VID:SLOP POS TRIG:REC:VID:SLOP?
Notes	:TRIGger[:SEQuence]:RECording:IF:SLOPe may be used as an alias
Preset	POS
State Saved	Saved in instrument state.
Range	Pos Neg
Help Map ID	25845
Instrument S/W Revision	A.01.60 or later

View/Display

The View/Display menu contains the Display branch key, which allows you to set many display properties. is described in the Meas Common Functions PD (epsg1080608). Also, many View Preset softkeys will appear under this menu. These set up measurement-specific views, which are described in individual measurement PDs. A view in this application is simply a preset; i.e., a choice of layout, trace data assignment, and trace formatting and scaling. After a view preset is performed, the resulting arrangement can then be changed by any available trace manipulation functions or by changing the layout. All measurements have a default view that is used when they are first started, and the first listed preset view will restore that arrangement without otherwise affecting the measurement.

This menu contains keys that allow control over the way data is displayed. The Layout key is described here. Other keys specific to measurements will be described in their own descriptions.

Key Path	Front Panel
Mode	VSA, LTE
Help Map ID	25898
Instrument S/W Revision	A.01.60 or later

Layout

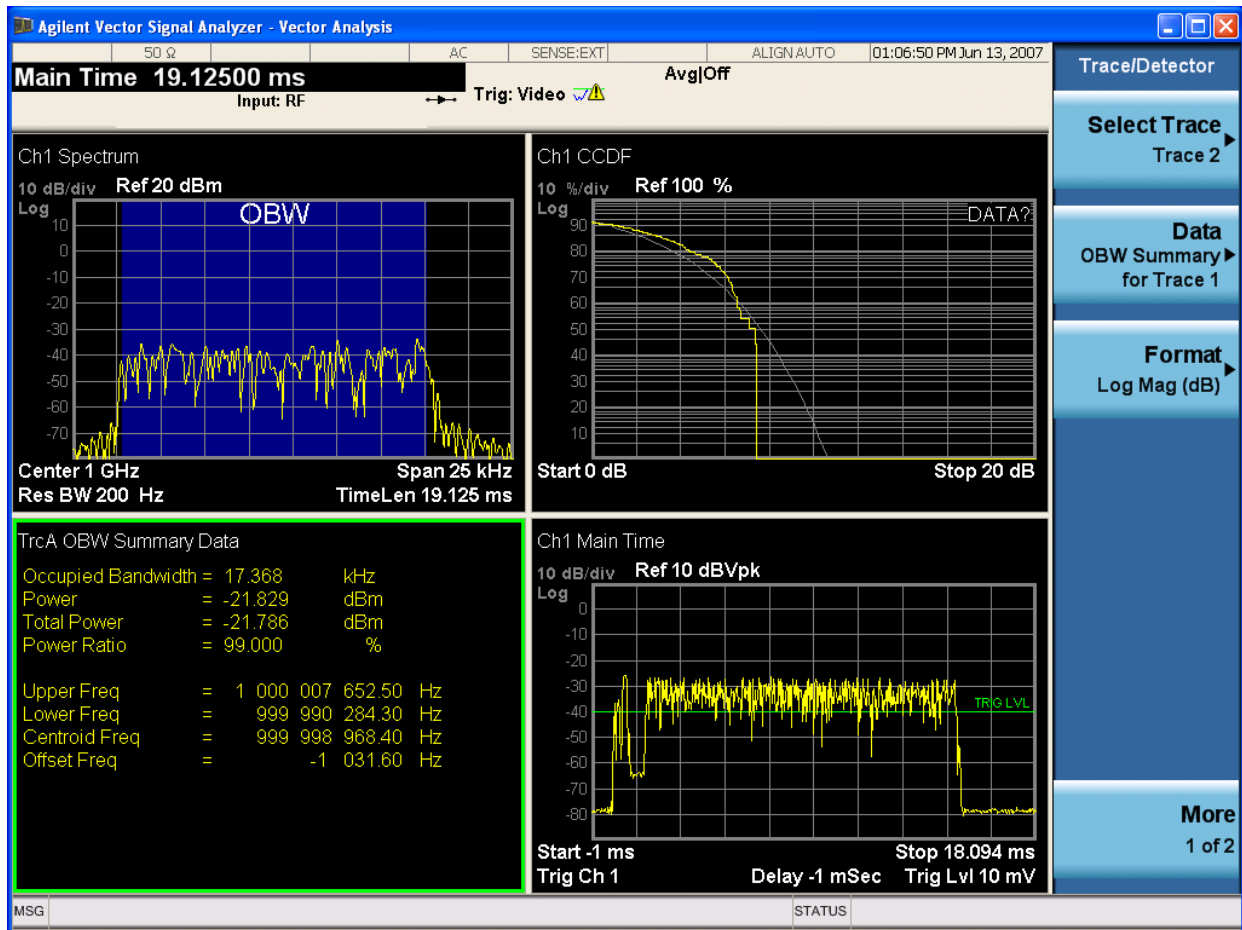
This key allows you to choose the number and position of windows on the screen. Each window contains one trace. The selected trace is always visible and its window outlined in green. The Window zoom key toggles between multiple windows and a single window mode without changing the setting for Layout.

Single layout has one window.

Stack 2 layout has two windows, one on top of the other, that display either traces 1 (top) and 2 (bottom) or traces 3 and 4. The pair that is showing always includes the selected trace.

Stack 3 layout has three windows that display, top to bottom, traces 1, 2, 3 or traces 2, 3, 4.

Grid 2x2 layout has 4 windows, arranged 2x2. They display (in order top to bottom, left to right) traces 1, 2, 3, and 4.

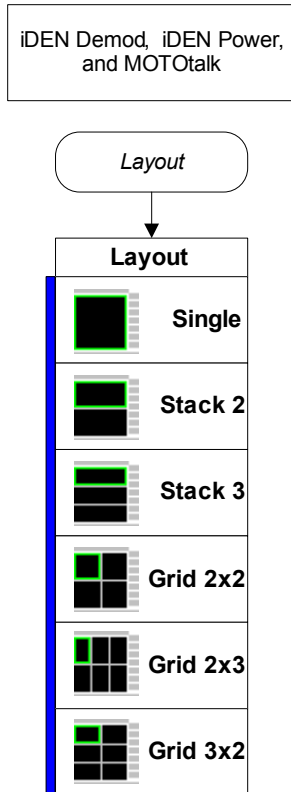


Grid 2x2 layout with Trace 2 selected

There are two other layouts that are available for iDEN Power, iDEN Demod and MOTOTalk measurements, since these allow 6 traces.

Grid 2x3 layout has 2 rows of 3 windows that display all 6 traces in order, top to bottom, them left to right.

Grid 3x2 layout has 3 rows of 2 windows that display all 6 traces in order, top to bottom, them left to right.



Key Path	View/Display
Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk
Remote Command	:DISPlay:<meas>:WINDow:FORMat SINGLE TWO TRI QUAD :DISPlay:<meas>:WINDow:FORMat?
Example	DISP:VECT:WIND:FORM TWO DISP:IPOW:WIND:FORM GR2X3 DISP:VECT:WIND:FORM?
Dependencies/Couplings	If the window is currently zoomed, selecting a layout (even the current one) will switch it to tiled mode.
Preset	TWO QUAD QUAD QUAD QUAD QUAD QUAD QUAD GR2X3 TRI
State Saved	Saved in instrument state.
Range	Single Stack 2 Stack 3 Grid 2x2 Grid 2x2 Grid 2x3 Stack 3
Help Map ID	25855
Instrument S/W Revision	A.01.60 or later

Remote Results

Remote SCPI Commands and Data Queries

VSA based Measurements produce a rich variety of results which may be displayed in any of 4 traces. A result may consist of an array of X,Y trace data that is typically shown as a graph, or scalar results that are displayed as a table. The Symbol/Error result that is part of many demodulation measurements actually displays both a trace table (the error statistics) and trace data (the symbol information, which is not graphed but listed). The CALC:<meas>:DATA<n> commands allow you to retrieve any trace data or trace table. This family of commands also allow you to get information about the names of data results available and the units associated with them, as well as names and results of meta-data associated with traces.

Selected results are available via the FETCh and READ SCPI interfaces. These commands refer to data results by arbitrary index number rather than by trace number.

:READ, :FETCh

The SCPI MEASure, READ, and FETCh are typically offered by applications with focus on manufacturing test, where a fixed set of desired results is known in advance and seldom changes. The VSA based measurements are many, due to a focus on development. Thus, for most VSA based measurements there is no standard configuration that will yield a useful measurement 90% of the time. Thus, the MEASure function will not be offered for most measurements in the VSA Application. However, READ and FETCh may be implemented for select results. Note that these results will also still be available using the CALC:<meas>:DATA:TABLE family of commands.

ACP and OBW are available in all VSA based measurements. To retrieve the ACP or OBW data, the function must be enabled on a frequency-domain trace and the associated summary data table must be assigned to another trace. Note however, the index n in the following commands is not trace number, but an index picked out of the tables shown below.

:FETCh:<meas> [n] ?

:READ:<meas> [n] ?

The results available for various values of n are shown below:

Condition	N	Results Returned
Mode = VSA LTE	Not specified or n=1	Reserved for selected results of VSA measurements. If not used for a particular measurement, no result is returned and error -114 Header suffix out of range is generated
Mode = VSA LTE	2 – 50	Reserved for selected results of VSA measurements. If not used for a particular measurement, no result is returned and error -114 Header suffix out of range is generated

Mode = VSA LTE, ACP on trace 1	51	<p>ACP Summary for trace 1</p> <p>Returns 28 comma-separated scalar results, corresponding to the swept ACP results where possible; n/a elsewhere:</p> <p>Returns 28 comma-separated scalar results, in the following order.</p> <ol style="list-style-type: none"> 1. 0.0 2. Total carrier power (dBm) (same as item 4, because only 1 carrier supported) 3. 0.0 4. Reference carrier power (dBm) 5. Lower offset A - relative power (dB) 6. Lower offset A - absolute power (dBm) 7. Upper offset A - relative power (dB) 8. Upper offset A - absolute power (dBm) 9. Lower offset B - relative power (dB) 10. Lower offset B - absolute power (dBm) 11. Upper offset B - relative power (dB) 12. Upper offset B - absolute power (dBm) ... 21. Lower offset E - relative power (dB) 22. Lower offset E - absolute power (dBm) 23. Upper offset E - relative power (dB) 24. Upper offset E - absolute power (dBm) 25. n/a 26. n/a 27. n/a 28. n/a 29. Overall ACP test result summary (0 indicates at least 1 failure, 1 indicates all passed) <p>If any result is not available, NaN (9.91 E 37) is returned. This can happen if ACP is turned off (all results unavailable), or when an offset is entirely off-screen. In the case where it is partially off-screen, the measured result is returned, even though its validity is questionable.</p>
Mode = VSA LTE, ACP on trace 2	52	<p>ACP Summary for trace 2</p> <p>see list for trace 1 summary</p>
Mode = VSA LTE, ACP on trace 3	53	<p>ACP Summary for trace 3</p> <p>see list for trace 1 summary</p>

Mode = VSA LTE, ACP on trace 4	54	ACP Summary for trace 4 see list for trace 1 summary
Mode = VSA LTE, ACP on trace 5	55	ACP Summary for trace 5 see list for trace 1 summary
Mode = VSA LTE, ACP on trace 6	56	ACP Summary for trace 6 see list for trace 1 summary
	57–60	no result returned; error –114, Header suffix out of range generated
Mode = VSA LTE, OBW on trace 1	61	OBW Summary for trace 1 Returns 9 comma-separated scalar results, corresponding exactly to the items in the OBW Summary trace: <ol style="list-style-type: none"> 1. OBW (Hz) 2. Pwr (dBm) 3. Total Pwr (dBm) 4. Pwr Ratio (no unit, E.g. 0.99) 5. OBW upper freq (Hz) 6. OBW lower freq (Hz) 7. Centroid freq (Hz) 8. Offset freq (Hz) 9. OBW Test Result (0 for fail, 1 for pass) If the results are not available, NaN (9.91 E 37) is returned.
Mode = VSA LTE, OBW on trace 2	62	OBW Summary for trace 2 see list for trace 1 summary
Mode = VSA LTE, OBW on trace 3	63	OBW Summary for trace 3 see list for trace 1 summary
Mode = VSA LTE, OBW on trace 4	64	OBW Summary for trace 4 see list for trace 1 summary
Mode = VSA LTE, OBW on trace 5	65	OBW Summary for trace 5 see list for trace 1 summary
Mode = VSA LTE, OBW on trace 6	66	OBW Summary for trace 6 see list for trace 1 summary

:CALCulate:DATA

Once measurement data result is assigned to a trace, the data can be retrieved by using one of the following commands (where <n> is the trace number and <meas> is the current VSA based measurement).

:CALC:<meas>:DATA<n>?

:CALC:<meas>:DATA<n>:RAW?

The first form of the command retrieves the data as formatted on the display. For example, if (in a vector measurement) you have the Spectrum result in LogMag format on trace 1, then

:CALC:VECT:DATA1?

will return an array of spectrum amplitude (Y data) in units of dBm, and

:CALC:VECT:DATA1:RAW?

will return the Y data in its underlying units of Volts (peak) squared.

(To get data from displayed tables, see CALCulate:DATA:TABLE commands below.)

The CALC:<meas>:DATA commands get data from traces. There are many results available from a VSA based measurement, and only 4 traces in which to view them. View Preset commands are one way of displaying frequently-used results in standard trace locations. Or you may assign any measurement result to any trace using the softkeys under Trace/Detector, Data. The SCPI command for doing this is:

:DISP:<meas>:TRAC<n>:FEED "<data_name>"

For example, if (in a vector measurement) you wish to view the CCDF result in trace 4, you send:

:DISP:VECT:TRAC4:FEED "CCDF1"

(If the measurement has not run yet, use INIT:IMM to run it.) Then the CCDF data may be retrieved using

CALC:VECT:DATA4?

or

CALC:VECT:DATA4:RAW?

See the Data command (under Trace/Detector) and the View Preset commands (under View/Display) in this document as well as the PDs for each VSA based measurement for more details on assigning data to traces.

Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:DATA[1] 2 3 4? [Y X XY[, OFF ON 0 1]]

Example	<pre>CALC:VECT:DATA1? CALC:VECT:DATA1? Y,ON CALC:VECT:DATA1? X CALC:VECT:DATA1? XY</pre>
Notes	<p>Query only. This retrieves the data in the designated trace as displayed.</p> <p>E.g., if Trace 1 is assigned Spectrum data and formatted as LogMag, then :CALC:VECT:DATA1? will return the Y data in dBm. If the X axis is scaled to show only a portion of the trace data, only the data shown will be returned.</p> <p>The numeric format of the returned data is controlled by FORMat[:TRACe][:DATA] command</p> <p>The optional parameters control what data is returned.</p> <p>:CALC:VECT:DATA1? Y is the same as :CALC:VECT:DATA1? with no parameter. It returns an array of Y values.</p> <p>:CALC:VECT:DATA1? X returns an array of X values that correspond to the Y values above.</p> <p>:CALC:VECT:DATA1? XY returns interleaved X and Y data. I.e.: <x1><y1><x2><y2>...</p> <p>Normally, this command only returns the data between the current X scale limits. If the optional ",OFF" or ",0" switch is included at the end of the command, then all data is returned (regardless of X scaling or the state of All Frequency Points).</p> <p>Note: the X and Y parameters in this command refer to the display's horizontal and vertical axes. Normally the X axis is the independent variable, but if the display format is Constellation or IQ, then</p> <p>CALC:<meas>:DATA<n>? [Y] returns the imaginary part of the data, and CALC:<meas>:DATA<n>? X returns the real part of the data. If you want the values of the independent variable, change to a non-vector format (such as Log Mag) and use CALC:<meas>:DATA<n>? X</p>
Help Map ID	25716
Instrument S/W Revision	A.01.60 or later

:CALCulate:DATA:RAW

Retrieves trace data in its underlying units, before the formatting calculation that converts it to displayed units. Underlying units are typically Volts peak (for signal results) or Volts peak squared (for power results). All data points are returned, whether or not they are displayed.

Mode	VSA, LTE
------	----------

Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:DATA[1] 2 3 4 :RAW?
Example	CALC:VECT:DATA1:RAW?
Notes	Query only. This retrieves the unformatted Y data in the designated trace. If Y data is complex, it is returned as <y_real1><y_imag1><y_real2><y_imag2> etc.
Help Map ID	25717
Instrument S/W Revision	A.01.60 or later

:CALCulate:DATA:RAW:COMPLex

This command is used to determine if the data retrieved by CALC:<meas>:DATA:RAW<n>? is complex.

Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:DATA[1] 2 3 4 :RAW:COMPLex?
Example	CALC:VECT:DATA1:RAW:COMP?
Notes	Query only. Returns 1 if the trace data is complex, 0 if it is real.
Help Map ID	25718
Instrument S/W Revision	A.01.60 or later

:CALCulate:DATA:POINTs commands

This query returns the number of points that will be returned by CALCulate:<meas>:DATA<n>?

X axis scaling and whether All Frequency Points is on or off can affect this number.

Note: for the

CALCulate:<meas>:DATA<n>? XY

command there are 2 numbers returned per data point.

Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:DATA[1] 2 3 4 :POINTs? [OFF ON 0 1]
Example	CALC:VECT:DATA1:POINTs?

Notes	<p>Query only.</p> <p>Use the optional "OFF 0" parameter to determine the number of points that will be returned by the the optional command form: :CALCulate:<meas>:DATA<n>? Y X XY,OFF 0</p> <p>Note that this is points, not array size. If the XY parameter is included, there are 2 numbers returned per point.</p> <p>(ON or 0, which means use the X-scaled version, is the default and the result is the same as if the parameter is omitted).</p>
Help Map ID	25719
Instrument S/W Revision	A.01.60 or later

This query returns the number of points that will be returned by

CALCulate:<meas>:DATA:RAW<n>?

Note: for complex trace data, there are 2 numbers returned per data point.

Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:DATA[1] 2 3 4 :RAW:POINts?
Example	CALC:VECT:DATA1:RAW:POINts?
Notes	Query only.
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

:CALCulate:DATA:TABL commands

Some traces have tabular data is associated with them. In fact, there may be only a table and no trace data. Each entry in the table consists of a name, a measured value, and units. The units are sometimes not shown. You can programmatically retrieve arrays of all the names, all the values, and all the units of a table. These arrays are all ordered so that corresponding indices have associated values, e.g., the 4th name in the names array corresponds to the 4th value in the results array. (Note that the array order may not be the same as the displayed order.) You can also get a particular result from the table by name. Here is a summary of the remote table data commands.

Command	Returns	Example
CALCulate:<meas>:DATA<n>:TABLe?	All table data results (as an array)	CALC:DDEM:DATA4:TABL?

CALCulate:<meas>:DATA<n>:TABLe? "<name>"	The table data result referred to by name	CALC:DDEM:DATA4:TABL? "EvmPeak"
CALCulate:<meas>:DATA<n>:TABLe:NAM es?	Comma- separat ed list of all table data names	CALC:DDEM:DATA4:TABL:NA M?
CALCulate:<meas>:DATA<n>:TABLe:UNI T?	Comma- separat ed list of all table data units	CALC:DDEM:DATA4:TABL:UNI T?

For example, if within the Vector Analysis measurement, you have an OBW Summary Table displayed in trace 2, CALC:DDEM:DATA2:TABL:NAM? would return the table names as follows:

"Obw,Pwr,TotalPwr,PwrRatio,ObwUpper,ObwLower,Centroid,Offset"

and CALC:DDEM:DATA2:TABL:UNIT? would return the units. (A null string means the result is unitless.)

"Hz,Vrms^2,Vrms^2,,Hz,Hz,Hz,Hz"

You can then get all the table results by sending

CALC:DDEM:DATA2:TABL?

Result number 1 is Obw and has units of Hz, result number 2 is Pwr with units of Vrms^2, and so on.

You can also get individual table entries by asking for them by name. Any name returned from the CALC:DDEM:DATA2:TABL:NAM? query may be used. For example, to get TotalPwr you can send the following query:

CALC:DDEM:DATA2:TABL? "TotalPwr"

The following query gets data from a table shown in the designated trace. Tables shown on the display typically have the name of a parameter followed by its measured value

Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk

Remote Command :CALCulate:<meas>:DATA[1] | 2 | 3 | 4 :TABLe [:NUMBer] ?
 [<string>]

Example CALC:DDEM:DATA2:TABL? "Obw"

Notes Query only. If sent without a string specifier, this returns the entire table for the designated trace. If sent with a string specifier, returns a specific table entry in the designated trace. The string specifier must be delimited by single or double quotes. A list of valid strings can be obtained using CALC:<meas>:DATA:TABL:NAM? If an invalid string is sent, an error is generated.

Help Map ID 25720

Instrument S/W Revision A.01.60 or later

The following query returns a comma-separated list of all the names of the table data entries for the designated trace. Each of names may be used (surrounded by quotes or double quotes) as a parameter in the previous command. The names appear in the same order as the data returned by the CALC:<meas>:DATA<n>:TABL? query.

Mode VSA, LTE

Measurement <meas>:=VECTor | ADEMod | DDEMod | W11A | W11B | EVM | IPO
 Wer | IDEMod | MOTotalk

Remote Command :CALCulate:<meas>:DATA[1] | 2 | 3 | 4 :TABLe:NAMEs?

Example CALC:VECT:DATA1:TABL:NAM?

Notes Query only. This retrieves the names of the table entries for the designated trace. Each of these names may be used in the CALC:<meas>:DATA:TABL? '<name>' command to access a single table entry.

Help Map ID 0

Instrument S/W Revision A.01.60 or later

The following query returns a comma-separated list of all the units for the table data entries for the designated trace. If a data result is unitless, an empty string appears in the list for that result. The units appear in the same order as the data returned by the CALC:<meas>:DATA<n>:TABL? query.

Mode VSA, LTE

Measurement <meas>:=VECTor | ADEMod | DDEMod | W11A | W11B | EVM | IPO
 Wer | IDEMod | MOTotalk

Remote Command :CALCulate:<meas>:DATA[1] | 2 | 3 | 4 :TABLe:UNIT?

Example CALC:VECT:DATA1:TABL:UNIT?

Notes	Query only. This retrieves a list of units for table entries for the designated trace. The units are given in the order that the entries are sent from the :CALC:<meas>:DATA:TABL? command.
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

The following table data is available in all measurements when the ACP function is turned on and the associated summary table is shown in a trace:

Result name	Displayed Unit	Remote Name	Remote Unit
Reference Bandwidth	Hz	RefBw	Hz
Reference Alpha		RefAlpha	
Reference Power	dBm	RefPwr	Vrms^2
Offset	Hz	Offset1, Offset2, Offset3, Offset4, Offset5	Hz
BW	Hz	Bw1, Bw2, Bw3, Bw4, Bw5	Hz
Alpha		Alpha1, Alpha2, Alpha3, Alpha4, Alpha5	
Lower Pwr	dBm	LowPwr1, LowPwr2, LowPwr3, LowPwr4, LowPwr5	Vrms^2
Lower ACPR	dB	LowRatio1, LowRatio2, LowRatio3, LowRatio4, LowRatio5	
Upper Pwr	dBm	HiPwr1, HiPwr2, HiPwr3, HiPwr4, HiPwr5	Vrms^2
Upper ACPR	dB	HiRatio1, HiRatio2, HiRatio3, HiRatio4, HiRatio5	
Max ACPR	dB	MaxRatio1, MaxRatio2, MaxRatio3, MaxRatio4, MaxRatio5	

The following table data is available in all measurements when the OBW function is

turned on and the associated summary table is shown in a trace:

Result name	Displayed Unit	Remote Name	Remote Unit
Occupied Bandwidth	Hz	Obw	Hz
Power	dBm	Pwr	Vrms^2
Total Power	dBm	TotalPwr	Vrms^2
Power Ratio	%	PwrRatio	
Upper Freq	Hz	ObwUpper	Hz
Lower Freq	Hz	ObwLower	Hz
Centroid Freq	Hz	Centroid	Hz
Offset Freq	Hz	Offset	Hz

:CALCulate:DATA:HEADer commands

Trace data also has meta-data associated with it, called headers, which is visible if you export trace data in text format and . The headers have a name and a value. You can obtain header data by name from any trace by using the CALCulate:<meas>:DATA:HEADer commands.

The following query returns a comma-separated list of all the header names associated with the designated trace. Each of names may be used (surrounded by quotes or double quotes) as a parameter in the other CALC:<meas>:DATA<n>:HEAD queries.

Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:DATA[1] 2 3 4 :HEADer :NAMEs?
Example	CALC:VECT:DATA1:HEAD:NAM?
Notes	Query only. Returns a comma-separated list of header names.
Help Map ID	25768
Instrument S/W Revision	A.01.60 or later

This query returns whether the designated header on the designated trace may be queried as a number, or by a string only.

Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:DATA[1] 2 3 4 :HEADer :TYPE? <string>

Example	CALC:VECT:DATA1:HEAD:TYPE? 'XDelta'
Notes	Query only. This retrieves the type of the named header for the designated trace. The name (delimited by single or double quotes) is one of the names returned by the CALC:<meas>:DATA:HEAD:NAMes? If a valid header name is passed in, the return value from this query is either STR or NUMB. NONE is returned if there is no such header.
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

This query gets a header by name from the designated trace and returns it as a string.

Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:DATA[1] 2 3 4:HEADer:STRing? <string>
Example	CALC:VECT:DATA1:HEAD:STR? 'WindowType'
Notes	Query only. This retrieves the named header for the designated trace. The name (delimited by single or double quotes) is one of the names returned by the CALC:<meas>:DATA:HEAD:NAMes? The return value is a string. If the requested header value is a numeric, or if there is no such header, an empty string is returned..
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

This query gets a numeric header by name from the designated trace and returns it in a format determined by the last FORM command.

Mode	VSA, LTE
Measurement	<meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPO Wer IDEMod MOTotalk
Remote Command	:CALCulate:<meas>:DATA[1] 2 3 4:HEADer[:NUMBer]? <string>
Example	CALC:VECT:DATA1:HEAD? 'XDelta'

Notes	<p>Query only. This retrieves the named header for the designated trace. This form of the HEAD? query is for headers whose type is NUMB (as determined by :CALC:<meas>:DATA:HEAD:TYPE?)</p> <p>The name parameter (delimited by single or double quotes) is one of the names returned by the CALC:<meas>:DATA:HEAD:NAMes? The format of the return data is determined by the FORMat[:TRACe][:DATA] command.</p> <p>If used to query a header whose type is STR, or there is no such header, NaN (9.91e37) is returned</p>
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

Other CALCulate:DATA commands

If one or more ACP or OBW limit tests are active, then the CALC:CLIMits:FAIL? command will return the aggregate pass or fail status.

The monitor spectrum measurement is used as a quick, convenient means of looking at the entire spectrum. While the look and feel are similar to the Spectrum Analyzer mode, the functionality is greatly reduced for easy operation. The main purpose of the measurement is to show the spectrum. The default span should cover an appropriate frequency range of the application. For measurement results and views, see “View/Display” on page 678.

This topic contains the following sections:

“Measurement Commands for Monitor Spectrum” on page 635

“Remote Command Results for Monitor Spectrum Measurement” on page 635

Measurement Commands for Monitor Spectrum

The following commands can be used to retrieve the measurement results:

```
:CONFigure:MONitor
```

```
:CONFigure:MONitor:NDEFault
```

```
:INITiate:MONitor
```

```
:FETCh:MONitor[n]?
```

```
:READ:MONitor[n]?
```

```
:MEASure:MONitor[n]?
```

For more measurement related commands, see the SENSE subsystem, and the section Remote Measurement Functions@29978.

Remote Command Results for Monitor Spectrum Measurement

n	Results Returned
n=1 (or not specified)	Returns trace1 data with comma separated floating numbers
n=2	Returns trace2 data with comma separated floating numbers
n=3	Returns trace3 data with comma separated floating numbers

Key Path	Meas
Instrument S/W Revision	A.01.60 or later

AMPTD Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters. These functions control how data on the vertical (Y) axis is displayed and control instrument settings that affect the vertical axis.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Ref Value

Sets the absolute power reference value. However, since the Auto Scaling is defaulted to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

Key Path	AMPTD Y Scale
Mode	All except SA and BASIC
Remote Command	:DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RLEV el <real> :DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RLEV el?
Example	DISP:MON:VIEW:WIND:TRAC:Y:RLEV 2.0 DISP:MON:VIEW:WIND:TRAC:Y:RLEV?
Dependencies/Couplings	When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	10.00 dBm
State Saved	Saved in instrument state.
Min	-250.00 dBm
Max	250.00 dBm
Test MIN/MAX/DEF	Yes
Test UP/DOWN	10.0 dB
Instrument S/W Revision	A.01.60 or later

Attenuation

Accesses a menu of functions that enable you to change the attenuation settings.

See AMPTD Y Scale, “Attenuation” on page 683 in the “Common Measurement Functions” section for

more information.

Key Path	AMPTD Y Scale
Instrument S/W Revision	A.01.60 or later

Scale/Div

Sets the logarithmic units per vertical graticule division on the display. However, since the Auto Scaling is defaulted to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

Key Path	AMPTD Y Scale
Mode	All except SA and BASIC
Remote Command	:DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIV ision <rel_ampl> :DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIV ision?
Example	DISP:MON:VIEW:WIND:TRAC:Y:PDIV 5.0 dB DISP:MON:VIEW:WIND:TRAC:Y:PDIV?
Dependencies/Couplings	When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	10.00 dB
State Saved	Saved in instrument state.
Min	0.10 dB
Max	20.00 dB
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1, 2, 5, 10...
Instrument S/W Revision	A.01.60 or later

Presel Center

See AMPTD Y Scale, “[Presel Center](#)” on page 695 in the “Common Measurement Functions” section for more information.

Presel Adjust

See AMPTD Y Scale, “[Preselector Adjust](#)” on page 696 in the “Common Measurement Functions” section for more information.

Internal Preamp

Accesses a menu of functions that enable you to control the internal preamplifiers.

See AMPTD Y Scale, “[Internal Preamp](#)” on page 698 in the “Common Measurement Functions” section for more information.

Key Path	AMPTD Y Scale
Instrument S/W Revision	A.01.60 or later

Ref Position

Positions the reference level at the top, center or bottom of the Y Scale display. Changing the reference position does not change the reference level value.

Key Path	AMPTD Y Scale
Mode	All except SA and BASIC
Remote Command	:DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RPOS ition TOP CENTer BOTTom :DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RPOS ition?
Example	DISP:MON:VIEW:WIND:TRAC:Y:RPOS CENT DISP:MON:VIEW:WIND:TRAC:Y:RPOS?
Preset	TOP
State Saved	Saved in instrument state.
Range	Top Ctr Bot
Instrument S/W Revision	A.01.60 or later

Auto Scaling

Toggles the Auto Scaling function between On and Off.

Key Path	AMPTD Y Scale
Mode	All except SA and BASIC
Remote Command	:DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:COUP le 0 1 OFF ON :DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:COUP le?
Example	DISP:MON:VIEW:WIND:TRAC:Y:COUP ON DISP:MON:VIEW:WIND:TRAC:Y:COUP?

Dependencies/Couplings	<p>When Auto Scaling is On, and the Restart front-panel key is pressed, this function automatically determines the scale per division and reference values based on the measurement results.</p> <p>When you set a value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off.</p>
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	A.01.60 or later

Auto Couple

See “**AUTO COUPLE**” on page 811 in the section "Common Measurement Functions" for more information.

BW

Accesses a menu that enables you to specify the resolution bandwidth functions that control the bandwidth and filter selection.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Res BW

Sets the resolution bandwidth for the current measurement. If an unavailable bandwidth is entered with the numeric keypad, the closest available bandwidth is selected.

Key Path	BW
Mode	All except SA and BASIC
Remote Command	[:SENSE]:MONitor:BANDwidth[:RESolution] <freq> [:SENSE]:MONitor:BANDwidth[:RESolution]? [:SENSE]:MONitor:BANDwidth[:RESolution]:AUTO OFF ON 0 1 [:SENSE]:MONitor:BANDwidth[:RESolution]:AUTO?
Example	MON:BAND 2.4 MHz MON:BAND? MON:BAND:AUTO ON MON:BAND:AUTO?
Preset	WCDMA: Automatically calculated WIMAX OFDMA: 100kHz C2K: Automatically calculated PN: Automatically calculated GSM/EDGE: Automatically calculated TD-SCDMA: Automatically calculated 1xEVDO: 30kHz
State Saved	Saved in instrument state.
Min	1.0 Hz
Max	8.0 MHz
Test MIN/MAX/DEF	MIN MAX
Test UP/DOWN	Yes
Instrument S/W Revision	A.01.60 or later

Video BW

Changes the analyzer post-detection filter.

Key Path	BW
Mode	All except SA and BASIC
Remote Command	[:SENSe] :MONitor: BANDwidth: VIDEo <bandwidth> [:SENSe] :MONitor: BANDwidth: VIDEo? [:SENSe] :MONitor: BANDwidth: VIDEo: AUTO ON OFF 1 0 [:SENSe] :MONitor: BANDwidth: VIDEo: AUTO?
Example	MON: BAND: VID 10 MHz MON: BAND: VID? MON: BAND: VID: AUTO OFF MON: BAND: VID: AUTO?
Preset	WCDMA: Automatically calculated WIMAX OFDMA: 1MHz C2K: Automatically calculated PN: Automatically calculated GSM/EDGE: Automatically calculated TD-SCDMA: Automatically calculated 1xEVDO: 300kHz
State Saved	Saved in instrument state.
Min	1 Hz
Max	50 MHz
Test MIN/MAX/DEF	MIN MAX
Test UP/DOWN	Yes
Instrument S/W Revision	A.01.60 or later

VBW:3dB RBW

Selects the ratio between the video bandwidth and the equivalent 3 dB resolution bandwidth to be used for setting the VBW when VBW is in Auto.

Key Path	BW
Mode	All except SA and BASIC

Remote Command	[:SENSe]:MONitor:BANDwidth:VIDeo:RATio <real> [:SENSe]:MONitor:BANDwidth:VIDeo:RATio? [:SENSe]:MONitor:BANDwidth:VIDeo:RATio:AUTO OFF ON 0 1 [:SENSe]:MONitor:BANDwidth:VIDeo:RATio:AUTO?
Example	MON:BAND:VID:RAT 2 MON:BAND:VID:RAT? MON:BAND:VID:RAT:AUTO 0 MON:BAND:VID:RAT:AUTO?
Preset	1 ON
State Saved	Saved in instrument state.
Min	0.00001
Max	3000000
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1...3...10 sequence
Instrument S/W Revision	A.01.60 or later

Span:3dB RBW

Selects the ratio between span and resolution bandwidth.

The default setting is Auto with a Span:3 dB RBW ratio of 106:1. You can manually change this ratio by pressing the key, entering a new value, and pressing Enter.

Key Path	BW
Mode	All except SA and BASIC
Remote Command	[:SENSe]:MONitor:FREQuency:SPAN:BANDwidth[:RESolution]: RATio <integer> [:SENSe]:MONitor:FREQuency:SPAN:BANDwidth[:RESolution]: RATio? [:SENSe]:MONitor:FREQuency:SPAN:BANDwidth[:RESolution]: RATio:AUTO OFF ON 0 1 [:SENSe]:MONitor:FREQuency:SPAN:BANDwidth[:RESolution]: RATio:AUTO?
Example	MON:FREQ:SPAN:BAND:RAT 200 MON:FREQ:SPAN:BAND:RAT? MON:FREQ:SPAN:BAND:RAT:AUTO ON MON:FREQ:SPAN:BAND:RAT:AUTO?

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Preset	106
	ON
State Saved	Saved in instrument state.
Min	2
Max	10000
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1...3...10 sequence
Instrument S/W Revision	A.01.60 or later

Cont

See “[Cont \(Continuous Measurement/Sweep\)](#)” on page 813 in the section "Common Measurement Functions" for more information.

FREQ Channel

See “[FREQ Channel](#)” on page 701 in the section "Monitor Spectrum - Additional Measurement Functions" for more information.

Input/Output

See “[Input/Output](#)” on page 815 in the section "Common Measurement Functions" for more information.

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement.

See the "Marker Functions" section for more information

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Instrument S/W Revision	A.01.60 or later

Marker Type

Sets the marker control mode to **Normal**, **Delta** or **Off**. If the selected marker is Off, pressing Marker sets it to Normal and places a single marker at the center of the display. At the same time, **Marker X Axis Value** appears on the Active Function area.

Key Path	Marker
Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MODE POSition DELta OFF :CALCulate:MONitor:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MODE?
Example	CALC:MON:MARK:MODE POS CALC:MON:MARK:MODE?
Notes	If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area displays the marker value to its full entered precision.
Preset	OFF
State Saved	Saved in instrument state.

Range	Normal Delta Off
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

Marker X Axis Value (Remote Command only)

Sets the marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is **Off**, but is the SCPI equivalent of entering an X value if the control mode is **Normal** or **Delta**.

Remote Command	:CALCulate:MONitor:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:X <freq> :CALCulate:MONitor:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:X ?
Example	CALC:MON:MARK3:X 0 CALC:MON:MARK3:X?
Instrument S/W Revision	A.01.60 or later
Mode	All except SA and BASIC
Notes	If no suffix is sent, uses the fundamental units for the current marker X Axis Scale. If a suffix is sent that does not match the current marker X Axis Scale unit, an error “Invalid suffix” is generated. The query returns the marker’s absolute X Axis value if the control mode is Normal , or the offset from the marker’s reference marker if the control mode is Delta . The query is returned in the fundamental units for the current marker X Axis scale: Hz for Frequency and Inverse Time , seconds for Period and Time . If the marker is Off the response is not a number.
Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number (NAN).
State Saved	No
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	Not tested in SCPI test.

Marker X Axis Position (Remote Command only)

Sets the marker X position in trace points. It has no effect if the control mode is **Off**, but is the SCPI equivalent of entering a value if the control mode is **Normal** or **Delta** – except in trace points rather than X Axis Scale units. The entered value is immediately translated into the current X Axis Scale units for

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setting the value of the marker.

Remote Command	:CALCulate:MONitor:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:X :POSition <real> :CALCulate:MONitor:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:X :POSition?
Example	CALC:MON:MARK:X:POS 0 CALC:MON:MARK:X:POS?
Instrument S/W Revision	A.01.60 or later
Mode	All except SA and BASIC
Notes	The query returns the marker's absolute X Axis value in trace points if the control mode is Normal , or the offset from the marker's reference marker in trace points if the control mode is Delta . The value is returned as a real number, not an integer, corresponding to the translation from X Axis Scale units to trace points. If the marker is Off the response is not a number.
Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number (NAN).
State Saved	No
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	Not supported.

Marker Y Axis Value (Remote Command only)

Returns the marker Y Axis value in the current marker.

Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:Y ?
Example	CALC:MON:MARK11:Y?
Preset	Result dependant on markers setup and signal source
Instrument S/W Revision	A.01.60 or later

Properties

Accesses a menu that enables you to select the active marker, the reference marker and the trace for the

current measurement.

Key Path	Marker
Instrument S/W Revision	A.01.60 or later

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Instrument S/W Revision	A.01.60 or later

Relative To

Selects the desired marker. The selected marker is relative to its reference marker

Key Path	Marker, Properties
Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:R EFerence <integer> :CALCulate:MONitor:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:R EFerence?
Example	CALC:MON:MARK:REF 1 CALC:MON:MARK:REF?
Notes	A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error -221: "Settings conflict; marker cannot be relative to itself." When queried a single value is returned (the specified marker number's relative marker).
Preset	2 3 4 5 6 7 8 9 10 11 12 1
State Saved	Saved in instrument state.
Min	1
Max	12
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1
Instrument S/W Revision	A.01.60 or later

Marker Trace

Assigns the specified marker to the designated trace.

Key Path	Marker, Properties
Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:TRACe <integer> :CALCulate:MONitor:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:TRACe?
Example	CALC:MON:MARK:TRAC 1 CALC:MON:MARK:TRAC?
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	3
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1
Instrument S/W Revision	A.01.60 or later

Couple Markers

When this function is true, moving any marker causes an equal X Axis movement of every other marker which is not **Off**. By “equal X Axis movement” we mean that we preserve the difference between each marker’s X Axis value (in the fundamental x–axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x–axis units).

Key Path	Marker
Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer:COUPle[:STATe] ON OFF 1 0 :CALCulate:MONitor:MARKer:COUPle[:STATe]?
Example	CALC:MON:MARK:COUP ON CALC:MON:MARK:COUP?
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Test MIN/MAX/DEF	Yes

Instrument S/W Revision A.01.60 or later

All Markers Off

Turns off all markers on the current measurement.

Key Path	Marker
Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer:AOff
Example	CALC:MON:MARK:AOff
Instrument S/W Revision	A.01.60 or later

Marker Function

Accesses special marker functions such as marker noise, and power in a specified bandwidth or time interval.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Select Marker

Selects one of the 12 available markers.

Key Path	Marker Function
Instrument S/W Revision	A.01.60 or later

Marker Function Type

Sets the marker control function type to, Marker Noise, Band/Interval Power, Band Interval Density, or Marker Function Off.

Key Path	Marker Function
Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:F UNcTion NOISe BPOWer BDENsity OFF :CALCulate:MONitor:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:F UNcTion?
Example	CALC:MON:MARK:FUNC NOIS CALC:MON:MARK:FUNC?
Preset	OFF
State Saved	Saved in instrument state.
Range	Marker Noise Band/Interval Power Band Interval Density Marker Function Off
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Band Adjust

Accesses a menu that enables you to set the frequency span width and the left and right edge, or time

values, for the band or interval of the selected marker.

Key Path	Marker Function
Instrument S/W Revision	A.01.60 or later

Band/Interval Span for Frequency Domain

Sets the width of the frequency span for the selected marker.

Key Path	Marker Function
Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:F UNCTION:BAND:SPAN <freq> :CALCulate:MONitor:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:F UNCTION:BAND:SPAN?
Example	CALC:MON:MARK12:FUNC:BAND:SPAN 20 MHz CALC:MON:MARK12:FUNC:BAND:SPAN?
Dependencies/Couplings	Changing the Band/Interval Span necessarily changes the Band/Interval Left and Band/Interval Right values.
Preset	Depends on X axis range of selected Trace.
State Saved	Saved in instrument state.
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	Not supported.
Instrument S/W Revision	A.01.60 or later

Band/Interval Left for Frequency Domain

Sets the left edge frequency or time value for the band of the selected marker.

Key Path	Marker Function
Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:F UNCTION:BAND:LEFT <freq> :CALCulate:MONitor:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:F UNCTION:BAND:LEFT?
Example	CALC:MON:MARK12:FUNC:BAND:LEFT 20 GHz CALC:MON:MARK12:FUNC:BAND:LEFT?

Monitor Spectrum Measurement Marker Function

Dependencies/Couplings	Changing the Band/Interval Left necessarily changes the Band/Interval Span and Band/Interval Right values.
Preset	Depends on X axis range of selected Trace.
State Saved	Saved in instrument state.
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	Not supported.
Instrument S/W Revision	A.01.60 or later

Band/Interval Right for Frequency Domain

Sets the right edge frequency or time value for the band of the selected marker.

Key Path	Marker Function
Mode	All except SA and BASIC
Remote Command	:CALCulate:MONitor:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:F UNction:BAND:RIGHT <freq> :CALCulate:MONitor:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:F UNction:BAND:RIGHT?
Example	CALC:MON:MARK12:FUNC:BAND:RIGH 20 GHz CALC:MON:MARK12:FUNC:BAND:RIGH?
Dependencies/Couplings	Changing the Band/Interval Right necessarily changes the Band/Interval Left and Band/Interval Span values
Preset	Depends on X axis range of selected Trace.
State Saved	Saved in instrument state.
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	Not supported.
Instrument S/W Revision	A.01.60 or later

Marker To

There is no 'Marker To' functionality supported in Monitor Spectrum. The front-panel key displays a blank menu key when pressed.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Meas

See “[Meas](#)” on page 713 in the section "Monitor Spectrum - Additional Measurement Functions" for more information.

Meas Setup

Displays the setup menu for the current measurement. The measurement setup parameters include the number of measurement averages used to calculate the measurement result and the averaging mode. The setup menu also includes the option to reset the measurement settings to their factory defaults.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Avg/Hold Num

Specifies the number of measurement averages used when calculating the measurement result. The average is displayed at the end of each sweep.

After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

Key Path	Meas Setup
Mode	All except SA and BASIC
Remote Command	[:SENSe] :MONitor :AVERage :COUNT <integer> [:SENSe] :MONitor :AVERage :COUNT? [:SENSe] :MONitor :AVERage [:STATe] OFF ON 0 1 [:SENSe] :MONitor :AVERage [:STATe] ?
Example	MON:AVER:COUN 25 MON:AVER:COUN? MON:AVER ON MON:AVER?
Preset	10 OFF
State Saved	Saved in instrument state.
Min	1
Max	1000
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1
Instrument S/W Revision	A.01.60 or later

Avg Mode

Toggles the average mode between exponential (Exp) and Repeat.

Exp- continues measurement averaging, using the specified number of averages to compute each averaged value. The average is displayed at the end of each sweep.

Repeat- causes the measurement to reset the average counter each time the specified number of averages is reached.

Key Path	Meas Setup
Mode	All except SA and BASIC
Remote Command	<code>[:SENSE] :MONitor:AVERage:TCONtrol EXPonential REPEAT</code> <code>[:SENSe] :MONitor:AVERage:TCONtrol?</code>
Example	MON:AVER:TCON EXP MON:AVER:TCON?
Preset	EXPonential
State Saved	Saved in instrument state.
Range	ExpRepeat
Instrument S/W Revision	A.01.60 or later

Meas Preset

Restores all the measurement parameters to their default values.

Key Path	Meas Setup
Mode	All except SA and BASIC
Remote Command	<code>:CONFigure:MONitor</code>
Example	CONF:MON
Instrument S/W Revision	A.01.60 or later

Mode

See “[Mode](#)” on page 729 in the section "Monitor Spectrum - Additional Measurement Functions" for more information.

Mode Setup

See “[Mode Setup](#)” on page 741 in the section "Monitor Spectrum - Additional Measurement Functions" for more information.

Peak Search

There is no 'Peak Search' functionality supported in Monitor Spectrum. The front-panel key displays a blank menu key when pressed.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Recall

See “[Recall](#)” on page 861 in the section "Common Measurement Functions" for more information.

Restart

See “Restart” on page 879 in the section "Common Measurement Functions" for more information.

Save

See “[Save](#)” on page 881 in the section "Common Measurement Functions" for more information.

Single

See “[Single \(Single Measurement/Sweep\)](#)” on page 905 in the section "Common Measurement Functions" for more information.

Source

This mode does not have any Source control functionality

See “[Source](#)” on page 745 in the section "Monitor Spectrum - Additional Measurement Functions" for more information.

Span X Scale

Accesses a menu of functions that enable you to set the horizontal scale parameters.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Span

Changes the frequency range symmetrically about the center frequency.

Key Path	Span X Scale
Mode	All except SA, BASIC
Remote Command	[:SENSe] :MONitor:FREQuency:SPAN <freq> [:SENSe] :MONitor:FREQuency:SPAN?
Example	MON:FREQ:SPAN 1 MHz MON:FREQ:SPAN?
Dependencies/Couplings	Changing the span causes the resolution bandwidth to change automatically, and affects data acquisition time.
Preset	WCDMA: 10.0 MHz WIMAX OFDMA: 50.0 MHz C2K: 2.5MHz PN: 1.0 MHz GSM/EDGE: 1.0 MHz TD-SCDMA: 3.2 MHz 1xEVDO: 2.0MHz
State Saved	Saved in instrument state.
Min	10 Hz
Max	Hardware Dependent: Option 503 = 3.7 GHz Option 507 = 7.1GHz Option 508 = 8.5 GHz Option 513 = 13.8 GHz Option 526 = 27.0 GHz
Test MIN/MAX/DEF	Yes

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Span X Scale

Test UP/DOWN	UP/DOWN parameters supported. The step value follows the 1, 2, 5, 10...increment rule.
Instrument S/W Revision	A.01.60 or later

Full Span

Changes the Span to show the full frequency range of the analyzer.

Key Path	Span X Scale
Mode	All except SA and BASIC
Remote Command	[:SENSE] :MONitor:FREQuency:SPAN:FULL
Example	MON:FREQ:SPAN:FULL
Dependencies/Couplings	Sets the span to the full frequency range, and adjusts the center frequency accordingly.
Instrument S/W Revision	A.01.60 or later

Last Span

Changes the measurement span to the span setting of the previous measurement. If there is no existing previous span value, then the span remains unchanged.

Key Path	Span X Scale
Mode	All except SA and BASIC
Remote Command	[:SENSe] :MONitor:FREQuency:SPAN:PREVious
Example	MON:FREQ:SPAN:PREV
Dependencies/Couplings	Selecting last span changes the measurement span value.
Instrument S/W Revision	A.01.60 or later

Sweep/Control

Access a menu of functions that enable you to set up and control the sweep time for the current measurement

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Sweep Time

Selects the length of time in which the spectrum analyzer sweeps the displayed frequency span. Additional overhead time is required by the analyzer. It impacts the sweep rate, but is not calculated as part of the sweep time. Reducing the sweep time increases the rate of sweeps.

Key Path	Sweep/Control
Mode	All except SA and BASIC
Remote Command	[:SENSe] :MONitor :SWEep :TIME <time> [:SENSe] :MONitor :SWEep :TIME? [:SENSe] :MONitor :SWEep :TIME :AUTO OFF ON 0 1 [:SENSe] :MONitor :SWEep :TIME :AUTO?
Example	MON:SWE:TIME 100 ms MON:SWE:TIME? MON:SWE:TIME:AUTO ON MON:SWE:TIME:AUTO?
Dependencies/Couplings	When the user manually changes the Sweep Time, this set automatically goes to 'Man'.
Preset	Automatically Calculated
State Saved	Saved in instrument state.
MIN/MAX/DEF Support	Yes
Min	1 ms
Max	4000 s
Test MIN/MAX/DEF	MIN MAX
Test UP/DOWN	The same as SA PD defines
Instrument S/W Revision	A.01.60 or later

Pause

Pauses a measurement after the current data acquisition is complete. When Paused, the label on the key changes to Resume. Pressing Resume continues the measurement at the point where it had been paused.

See “Pause/Resume” on page 908 under Sweep/Control in the "Common Measurement Functions" section for more information.

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Gate

Accesses a menu that enables you to control the gating function .

The Gate functionality is used to view signals best viewed by qualifying them with other events.

See “Gate ” on page 913 in “common Measurement Functions” for more details.

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Points

Sets the number of points per sweep. The resolution of setting the sweep time depends on the number of points selected. If Preset is selected, the number of points per sweep defaults to 1001. The current value of points is displayed parenthetically, next to the sweep time in the lower right corner of the display.

Key Path	Sweep/Control
Mode	All except SA and BASIC
Remote Command	[:SENSE] :MONitor:SWEep:POINts <integer> [:SENSe] :MONitor:SWEep:POINts?
Example	:MON:SWE:POIN 1000 :MON:SWE:POIN?
Dependencies/Couplings	Whenever the number of sweep points changes, the sweep time is re-quantized.
Preset	1001
State Saved	Saved in instrument state.
Range	1 to 20001
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Trace/Detector

Accesses a menu that enables you to control the display, storage, detection and manipulation of trace data. Each trace is comprised of a series of data points in which X and Y axis information is stored. The analyzer updates the information for the active trace with each sweep of the current measurement.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Select Trace

Allows you to select which trace you want to use for the current measurement. You can select one of three traces. Monitor Spectrum supports 3 traces, numbered 1 through 3.

Key Path	Trace/Detector
Mode	All except SA and BASIC
Preset	Trace 1
State Saved	The number of the selected trace is saved in Instrument State
Instrument S/W Revision	A.01.60 or later

Trace Type

Allows you to select the type of trace you want to you use for the current measurement. You can assign a trace type to one of the three available traces.

The first page of this menu contains a 1-of-N selection of the trace type (**Clear Write, Average, Max Hold, Min Hold**) for the selected trace.

Key Path	Trace/Detector
Mode	All except SA and BASIC
Remote Command	:TRACe[1] 2 3 :MONitor:TYPE WRITe AVERAge MAXHold MINHold :TRACe[1] 2 3 :MONitor:TYPE?
Example	TRAC:MON:TYPE WRIT TRAC:MON:TYPE?
Notes	WRITe = Clear Write AVERAge = Average MAXHold = Maximum Hold MINHold = Minimum Hold

Monitor Spectrum Measurement Trace/Detector

Preset	WRITe
State Saved	Saved in instrument state.
Range	WRITe AVERAge MAXHold MINHold for traces 1 through 3
Instrument S/W Revision	A.01.60 or later

Update

Toggles a trace state between Update and Off. The Off selection makes the trace inactive (or a stored trace). This does not affect whether the trace is visible or not. Use the Display Show/Blank function to change the trace visibility.

Key Path	Trace/Detector
Mode	All except SA and BASIC
Remote Command	:TRACe[1] 2 3 :MONitor:UPDate[:STATE] ON OFF 0 1 :TRACe[1] 2 3 :MONitor:UPDate[:STATE] ?
Example	TRAC3:MON:UPD OFF TRAC3:MON:UPD?
Preset	ON
State Saved	Saved in instrument state.
Range	On Off (View)
Instrument S/W Revision	A.01.60 or later

Display

Controls the visibility of a trace. In **Blank**, traces do not display nor appear on printouts but are otherwise unaffected. They may be queried and markers may be placed on them

Key Path	Trace/Detector
Mode	All except SA and BASIC
Remote Command	:TRACe[1] 2 3 :MONitor:DISPlay[:STATE] ON OFF 0 1 :TRACe[1] 2 3 :MONitor:DISPlay[:STATE] ?
Example	TRAC:MON:DISP ON TRAC:MON:DISP?
Preset	ON OFF OFF
State Saved	Saved in instrument state.
Range	Show Blank
Instrument S/W Revision	A.01.60 or later

Detector

Accesses a menu of functions that enable you to control the detectors for the current measurement. The following choices are available:

Auto — the detector selected depends on marker functions, trace functions, average type, and the trace averaging function.

- Normal — the detector determines the peak of the CW-like signals, and it yields alternating maximums and minimums of noise-like signals. This is also referred to as Rosenfell detection.
- Average — the detector determines the average of the signal within the sweep points. The averaging method depends upon the Average Type selection (voltage, power or log scales).
- Peak — the detector determines the maximum of the signal within the sweep points.
- Sample — the detector indicates the instantaneous level of the signal at the center of the sweep points represented by each display point.
- Negative Peak — the detector determines the minimum of the signal within the sweep points.

In swept analysis, the time interval of the data collection for the display sweep points also represents a frequency interval. In FFT analysis, the sweep points represent just a frequency interval. The detector determines the relationship between the spectrum computed by the FFT and the single data point displayed for the sweep points.

Key Path	Trace/Detector
Mode	All except SA and BASIC
Remote Command	[:SENSE] :MONitor:DETector:TRACe AVERAge NEGAtive NORMAl POSitive SAMPlE [:SENSe] :MONitor:DETector:TRACe?
Example	MON:DET:TRAC NORM MON:DET:TRAC?

Monitor Spectrum Measurement Trace/Detector

Notes	The query returns a name that corresponds to the detector type as shown below. String Returned Definition NORM Normal AVER Average POS Peak SAMP Sample NEG Negative Peak
Dependencies/Couplings	When the Detector choice is Auto, the detector selected depends on average type.
Preset	NORMal
State Saved	Saved in instrument state.
Range	Normal Average(RMS) Peak Sample Negative Peak
Instrument S/W Revision	A.01.60 or later

Auto

Sets the detector for the currently selected trace to Auto. When the detector choice is Auto, the analyzer selects the detector. The selected detector depends on marker functions, trace functions, and trace averaging functions for the current measurement.

Key Path	Trace/Detector Trace/Detector, Detector
Mode	All except SA and BASIC
Remote Command	[:SENSe] :MONitor:DETEctor:AUTO ON OFF 1 0 [:SENSe] :MONitor:DETEctor:AUTO?
Example	MON:DET:AUTO OFF MON:DET:AUTO?
Dependencies/Couplings	When the Detector choice is Auto, the detector selected depends on average state and trace type.
Preset	ON

State Saved	Saved in instrument state.
Range	Auto Man
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

Clear Trace

Clears the selected trace from the display.

Key Path	Trace/Detector
Mode	All except SA and BASIC
Remote Command	:TRACe:MONitor:CLEAr [TRACE1] TRACE2 TRACE3
Example	TRAC:MON:CLE
Instrument S/W Revision	A.01.60 or later
Mode	All except SA and BASIC
Remote Command	:DISPlay:MONitor:VIEW:WINDow:TRACe[1] 2 3 :CLEAr
Example	DISP:MON:VIEW:WIND:TRAC:CLE
Instrument S/W Revision	A.01.60 or later

Clear All Traces

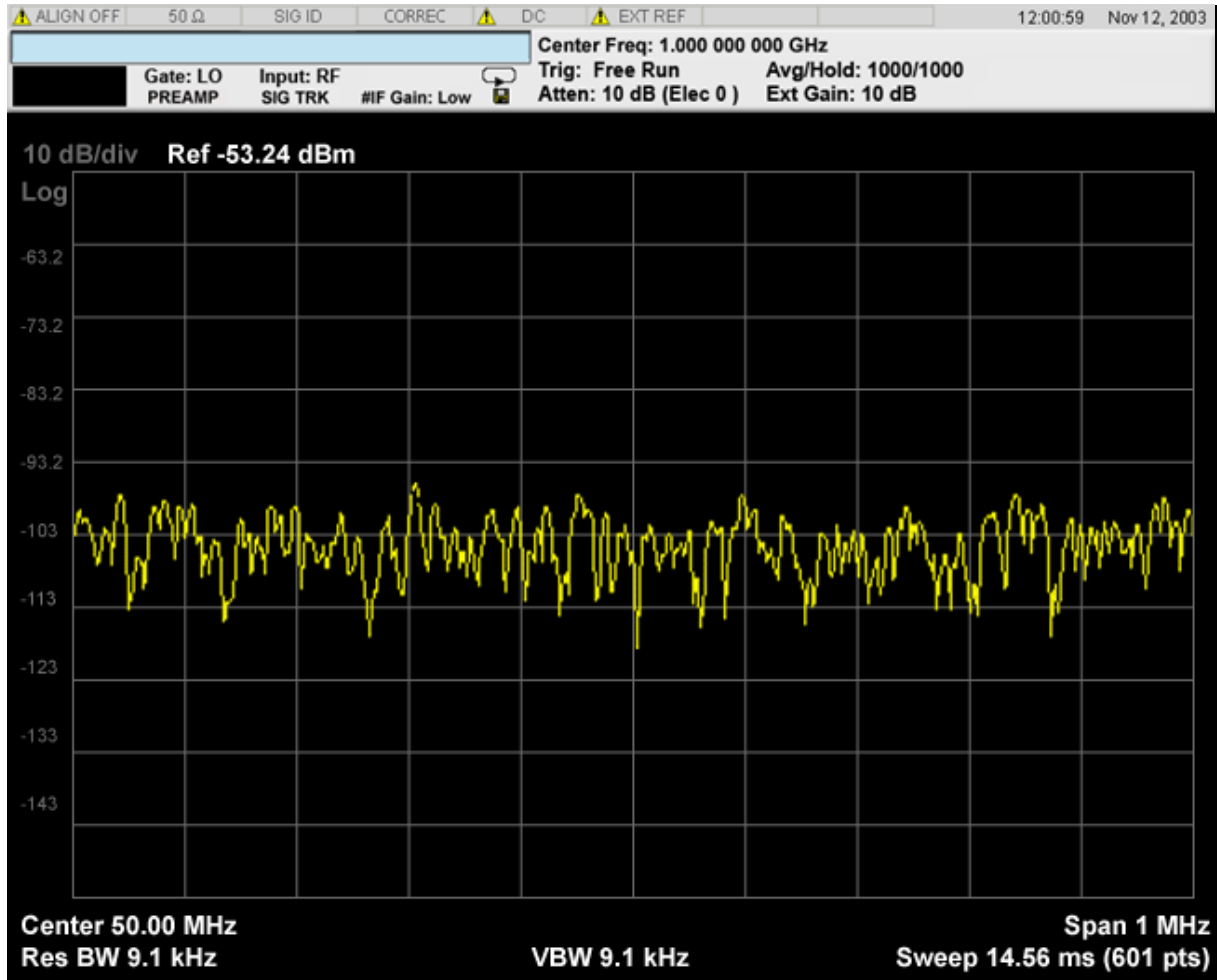
Clears all traces from the display.

Key Path	Trace/Detector
Mode	All except SA and BASIC
Remote Command	:TRACe:MONitor:CLEAr:ALL
Example	TRAC:MON:CLE:ALL
Instrument S/W Revision	A.01.60 or later

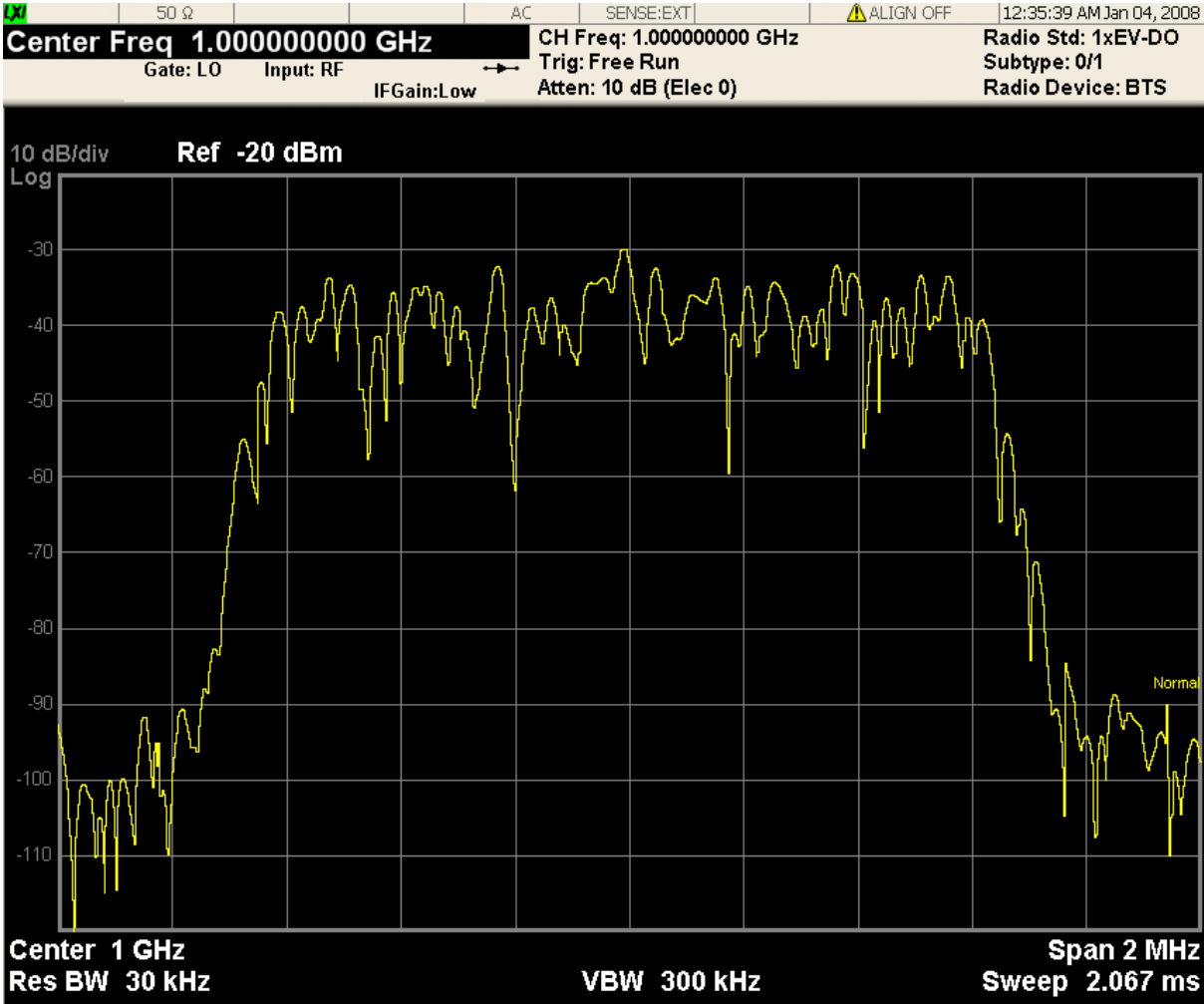
View/Display

Accesses a menu of functions that enable you to control certain functions related to the display of the analyzer.

There is a single trace view for this measurement.



When the mode is CDMA1xEVDO, the view will be like



The measurement has no results, but has a number of features that make it flexible and simple to use.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Display

Accesses a menu of functions that enable you to set the display parameters.
See “Display” on page 799 in the "Common Measurement Functions" section for more information.

Key Path	View/Display
Instrument S/W Revision	A.01.60 or later

Monitor Spectrum Measurement
View/Display

Monitor Spectrum - Additional Measurement Functions

The key and command descriptions in this section describe functions that operate the same in multiple measurements and/or modes. This section is a library of functions that is referenced by many measurements and modes

To find the exact description and parameters for functions in a specific measurement, always look in the measurement section of this documentation. Pressing the front-panel key or softkey and then pressing the green Help key also provides the correct information.

NOTE

If you want to print the documentation, be sure to select this section and the measurement of interest to ensure having all the information you need. See [“Printing Acrobat Files” on page 93](#) for further instructions about printing.

AMPTD Y Scale (Amplitude Y Scale)

Some Amplitude 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 Amplitude key activates the Amplitude menu and selects Reference Level as the active function.

Instrument S/W Revision A.01.60 or later

Attenuation

This key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case.

This menu controls both the electrical and mechanical attenuators and their interactions. The value read back on the key in square brackets is the current Total (Elec + Mech) attenuation. Note that when in “Pre-Adjust for Min Clip” this value can change at the start of every measurement.

All parameters in the Attenuation menus are Meas Global, meaning they are common to all the measurements and are unaffected by Meas Preset.

Key Path **AMPTD**
 Instrument S/W Revision A.01.60 or later

Mech Atten Auto/Man

You can modify the mechanical attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below. However, when the electrical attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key disappears. The Auto/Man state of the key is remembered and restored when the electrical attenuator is once again disabled.

Some measurement applications have functionality that can pre-adjust the input signal for minimum clipping. That is, it attenuates the input so it does not over-drive the analyzer. When this functionality is available, the Auto/Man selection is not available.

Remote Command: [:SENSe]:POWer[:RF]:ATTenuation <rel_amp1>
 [:SENSe]:POWer[:RF]:ATTenuation?
 [:SENSe]:POWer[:RF]:ATTenuation:AUTO OFF|ON|0|1
 [:SENSe]:POWer[:RF]:ATTenuation:AUTO?

Example: POW:ATT 20
 Sets the attenuator to manual mode, and sets the value to 20 dB.

AMPTD Y Scale (Amplitude Y Scale)

Dependencies/Couplings:	<p>When the electrical attenuator is enabled, the mechanical attenuator has no auto setting and Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electrical attenuator is once again disabled. If it is restored to man, the mechanical attenuation is set to the sum of the current values of mechanical and electrical attenuation, but if it is restored to Auto it recouples according to the Couplings, below.</p> <p>When the Input Attenuator is in 'auto', it uses the following algorithm to determine a value.</p> <p>Calculate a new value = ReferenceLevel + PreAmpGain + ExternalGain – RefLevelOffset - MaxMixerLevel + IF Gain.</p> <p>Limit this new value to be between 6 and 70 dB for MXA (or 60 dB for EXA). No value below 6 dB can ever be chosen by Auto.</p> <p>The resulting value should be rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step).</p>
Preset:	Auto (usually 10 dB, On)
State Saved:	Saved in State
Min:	0 dB
	<p>The mechanical attenuation cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.</p>
Max:	EXA: 60 dB MXA: 70 dB
Key Path:	AMPTD, Attenuation
Instrument S/W Revision:	A.01.60 or later

Enable Elec Atten

You can enable or disable the Electrical Attenuator. The Electrical Attenuator offers no significant advantage over the Mechanical Attenuator for front-panel operation. Therefore it is assumed you will use the Mechanical Attenuator when operating the analyzer from the front-panel.

The electronic attenuator is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then Enable Elec Atten is grayed out. If the Elec Atten is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz, which is to say the UI start, stop, center frequency and span values are all limited to a maximum of 3.6 GHz +

Frequency Offset.

Remote Command: [:SENSe]:POWer[:RF]:EATTenuation:STATe OFF|ON|0|1
[:SENSe]:POWer[:RF]:EATTenuation:STATe?

Example: POW:EATT:STAT ON

Dependencies/Couplings: The electronic attenuator is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Elec Atten is grayed out.

If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.

If either of the above is true, if the SCPI command is sent, a generic error indicating that the electronic attenuator is unavailable will be sent.

If the Electronic Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.

Preset: OFF

State Saved: Saved in instrument state.

Key Path: **AMPTD, Attenuation**

Instrument S/W Revision: A.01.60 or later

When the Electrical Attenuator is enabled, the Mechanical Attenuator transitions to a state in which it has no Auto function. Here are the rules for transitioning the Mechanical Attenuator:

When the Electrical Attenuator is enabled:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or RPG, and it behaves as it normally would in manual mode
- The Auto/Man state of Mech Atten is saved
- The Auto/Man line on the Mech Atten key disappears and the auto rules are disabled
- The Electrical Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elect Atten set to 10 dB. New total attenuation equals value before Elec Atten enabled.

AMPTD Y Scale (Amplitude Y Scale)

- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elect Atten set to 0 dB. New total attenuation does not equal value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elect Atten set to 24 dB. New total attenuation does not equal value before Elec Atten enabled.

When the Electrical Attenuator is disabled:

- The Elec Atten key is grayed out
- The Auto/Man state of Mech Atten is restored
- If now in Auto, Mech Atten recouples
- If now in man, Mech Atten sets to the value of total atten that existed before the Elec Atten was disabled. The resulting value should be rounded up to the smallest value possible given the Mech Atten Step setting - (That is, 57 dB would change to 58 dB when Mech Atten Step is 2 dB.)

Elec Atten

You can modify the electrical attenuation using this function

Remote Command:	<code>[:SENSe] :POWer [:RF] :EATTenuation <rel_ampl></code> <code>[:SENSe] :POWer [:RF] :EATTenuation?</code>
Restriction and Notes:	Electrical Attenuation's spec is defined only when Mechanical Attenuation is 6 dB.
Dependencies/Couplings:	When Enable Elec Atten is off, Elec Atten key is grayed out.
Preset:	0 dB
State Saved:	Saved in instrument state.
Min:	0 dB
Max:	24 dB
Key Path:	AMPTD, Attenuation
Instrument S/W Revision:	A.01.60 or later

Adjust Atten for Min Clip

This function is similar to the "Optimize Ref Level" function in some measurements. Its purpose is to set the combination of mechanical and electrical attenuation based on the current measured signal level so that clipping will be at a minimum.

This is a "one-time" function, that is, it executes once, when the key is pressed.

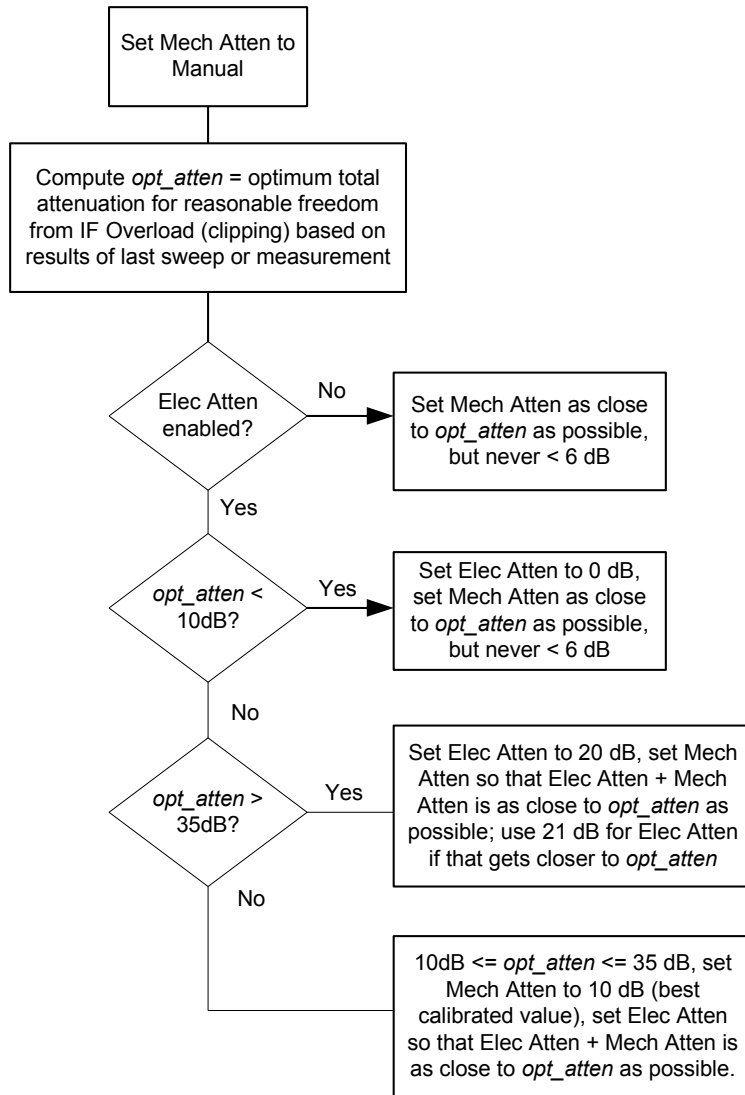
This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Remote Command:	<code>[:SENSe] :POWer [:RF] :RANGe :OPTimize IMMEDIATE</code>
------------------------	---

Key Path: **AMPTD, Attenuation**

Instrument S/W Revision: A.01.60 or later

The algorithm to be used is as follows:



vsd04

Pre-Adjust for Min Clip

This adjustment executes each time a measurement restarts. Therefore, in Continuous, it only executes before the first measurement.

This key is grayed out in measurements that do not support this functionality. The

AMPTD Y Scale (Amplitude Y Scale)

spectrum analyzer measurement, Swept SA, does not support this functionality.

Remote Command: [:SENSe]:POWer[:RF]:RANGe:OPTimize:ATTenuation
OFF|ELECTrical|COMBined
[:SENSe]:POWer[:RF]:RANGe:OPTimize:ATTenuation?

State Saved: Saved in State

Key Path: **AMPTD, Attenuation**

Instrument S/W Revision: A.01.60 or later

Remote Command: [:SENSe]:POWer[:RF]:RANGe:AUTO ON|OFF|1|0
[:SENSe]:POWer[:RF]:RANGe:AUTO?

Remote Command Notes: ON aliases to “Elec Atten Only”
OFF aliases to “Off”
The query returns true if not “Off”

Instrument S/W Revision: A.01.60 or later

Off

Example: :POW:RANGe:OPT:ATT OFF

Key Path: **AMPTD, Attenuation, Pre-Adjust for Min Clip**

Instrument S/W Revision: A.01.60 or later

Elec Atten Only

Example: :POW:RANGe:OPT:ATT ELEC

Key Path: **AMPTD, Attenuation, Pre-Adjust for Min Clip**

Instrument S/W Revision: A.01.60 or later

Mech + Elec Atten

Example: :POW:RANGe:OPT:ATT COMB

Key Path: **AMPTD, Attenuation, Pre-Adjust for Min Clip**

Instrument S/W Revision: A.01.60 or later

Mech Atten Step

This controls what step size is used when making adjustments to the Input Attenuation.

Remote Command:	<code>[:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] 10 dB 2 dB</code> <code>[:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] ?</code>
Example:	POW:ATT:STEP 2
Dependencies/Couplings:	Blanked in EXA if option FSA (2 dB steps) is not present. Attempts to set it via SCPI will yield the “Option not present” error. When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB
Remote Command Notes:	Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10.
Preset:	MXA: 2 dB EXA: 10 dB (2 dB with option FSA)
State Saved:	Saved in State
Key Path:	AMPTD, Attenuation
Instrument S/W Revision:	A.01.60 or later

Max Mixer Level

The Max Mixer Level controls the limitation on the Ref Level for a given attenuation setting, and therefore also interacts with the Auto rules for selecting the attenuation as a coupling from the reference level.

Remote Command:	<code>[:SENSe] :POWer [:RF] :MIXer :RANGe [:UPPer] <real></code> <code>[:SENSe] :POWer [:RF] :MIXer :RANGe [:UPPer] ?</code>
Example:	POW:MIX:RANG -15 dBm
Preset:	-10 dBm
State Saved:	Saved in State
Min:	-50 dBm
Max:	-10 dBm
Key Path:	AMPTD, Attenuation
Default Unit:	Depends on the current selected Y axis unit, see Swept SA discussion of Y Axis Unit
Instrument S/W Revision:	A.01.60 or later

AMPTD Y Scale (Amplitude Y Scale)

Range

This key is only available when I/Q is the selected input. It replaces the Attenuation key in that case.

Each input channel (I and Q) has four internal gain ranges. The maximum allowed voltage in each gain range is slightly more than the nominal value, so the break point between ranges is a couple millivolts higher than the nominal (setting a peak voltage of 0.502 mV will still map to the 0.5 V Peak range).

Gain Setting	Volts RMS	Volts Peak	Volts Peak - Peak	dBm (50Ω)	Break Point
0 dB	0.7071	1.0	2.0	10	n/a
6 dB	0.3536	0.5	1.0	4	0.502 V Peak
12 dB	0.1768	0.25	0.5	-2	0.252 V Peak
18 dB	0.0884	0.125	0.25	-8	0.127 V Peak

Key Path	AMPTD Y Scale
State Saved	No
Restriction and Notes	Visible only when the selected input is I/Q.
Instrument S/W Revision	A.01.60 or later

Range Auto/Man

The Auto setting for Range will cause the range to be set based on the Y Scale settings. When Range is “Auto”, the I & Q Range are set based on the top of the Y Scale when the Y scale is in dB units (for example, power), or to the max(abs(top), abs(bottom)) when the Y scale reference is not at top of screen.

Not all measurements support Range Auto/Man. If Auto is not supported in the current measurement, this key is grayed out and shows “Man” and MAN is returned to a SCPI query; but this does NOT change the Meas Global Auto/Man for Range, so when you go to a measurement that supports Auto, it goes back to Auto if it was previously in Auto.

Key Path	AMPTD Y Scale, Range
Remote Command	[:SENSE] :VOLTage:IQ:RANGe:AUTO OFF ON 0 1 [:SENSE] :VOLTage:IQ:RANGe:AUTO?
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man

Dependencies/Couplings	<p>When in Auto, both I Range and Q Range are set to the same value, computed as follows:</p> <p>Maximum absolute value is computed for the Y Scale. The top and bottom of the graph are computed based on Ref Value, Scale/Div, and Ref Position. Formula: $Y_{Max} = \max(\text{abs}(\text{top}), \text{abs}(\text{bottom}))$.</p> <p>The I Range and Q Range are then set to YMax.</p> <p>If Auto is not supported, sending the SCPI command will generate an error.</p>
Example	<p>Put the I Range and Q Range in manual.</p> <p>VOLT:IQ:RANG:AUTO OFF</p>
Instrument S/W Revision	A.01.60 or later

This is an alternate form of the SCPI command to match the POWER form of the I Range and Q Range SCPI.

Remote Command:	<pre>[:SENSE] :POWER :IQ :RANGe :AUTO OFF ON 0 1 [:SENSE] :POWER :IQ :RANGe :AUTO ?</pre>
Preset:	ON
Range:	Auto Man
Remote Command Notes:	The POW:IQ:RANG:AUTO is an alternate form of the VOLT:IQ:RANG:AUTO command. This is to maintain consistency with I Range and Q Range, which support both the POWER and VOLTage forms of the command.
Example:	<p>Put the I Range and Q Range in manual.</p> <p>POW:IQ:RANG:AUTO OFF</p>
Instrument S/W Revision:	A.01.60 or later

I Range

This is the internal gain range for the I channel when Input Path is I Only or Ind I/Q, and it is used for both the I and Q channels when Input Path is I+jQ. See [“I/Q Gain Ranges” on page 694](#).

Key Path	AMPTD Y Scale, Range
Remote Command	<pre>[:SENSE] :VOLTage :IQ [:I] :RANGe [:UPPer] <voltage> [:SENSE] :VOLTage :IQ [:I] :RANGe [:UPPer] ?</pre>
Preset	1 V Peak
State Saved	Saved in instrument state.
Range	1 V Peak 0.5 V Peak 0.25 V Peak 0.125 V Peak

AMPTD Y Scale (Amplitude Y Scale)

Dependencies/Couplings	When Q Same as I is On, the I Range value will be copied to the Q Range. Changing the value will also set Range = Man.
Remote Command Notes	The numeric entries are mapped to the smallest gain range whose break point is greater than or equal to the value, or 1 V Peak if the value is greater than 1 V.
Example	Set the I Range to 0.5 V Peak VOLT:IQ:RANG 0.5 V
Instrument S/W Revision	A.01.60 or later

This is an alternate form of the SCPI command to allow entry as a power.

Remote Command:	<code>[:SENSE] :POWER:IQ [:I] :RANGE [:UPPER] <ampl></code> <code>[:SENSE] :POWER:IQ [:I] :RANGE [:UPPER] ?</code>
Preset:	10.0 dBm
Range:	-20 dBm to 10 dBm
Min:	-20 dBm
Max:	10 dBm
Remote Command Notes:	The POWER form of the command is provided for convenience. It maps to the same underlying gain range parameter as the VOLTage form of the command. The Reference Z (not the I channel Input Z) is used to convert the power to peak voltage, which is then used to set the I Range as with the VOLTage form of the command. The power values of the 4 range states (1V Peak, 0.5V Peak, 0.25V Peak, and 0.125V Peak) will vary with Reference Z. Here are some examples: 50Ω 10, 4, -2, -8 75Ω 8.2, 2.2, -3.8, -9.8 600Ω -0.8, -6.8, -12.8, -18.9
Example:	Set the I Range to 0.5 V Peak when Reference Z is 50Ω and to 1.0 V Peak when Reference Z is 75Ω POW:IQ:RANG 4 dBm
Instrument S/W Revision:	A.01.60 or later

Q Range

Bring up the Q Range menu.

Key Path	AMPTD Y Scale, Range
Instrument S/W Revision	A.01.60 or later

Q Same as I Many, but not all, usages require the I and Q channels have an identical setup. To simplify channel setup, the Q Same as I will cause the Q channel range to be mirrored from the I channel. That way you only needs to set up one channel (the I channel). The I channel values are copied to the Q channel, so at the time Q Same as I is “Off” the I and Q channel setups will be identical.

Key Path	AMPTD Y Scale, Range, Q Range
Remote Command	[:SENSE] :VOLTage POWer:IQ:MIRRored OFF ON 0 1 [:SENSE] :VOLTage POWer:IQ:MIRRored?
Preset	On
State Saved	Saved in instrument state.
Range	On Off
Dependencies/Couplings	When On, the I Range value is mirrored (copied) to the Q Range.
Example	Turn off the mirroring of I Range to Q Range. VOLT:IQ:MIRR OFF POW:IQ:MIRR OFF
Instrument S/W Revision	A.01.60 or later

Q Range Value This is the internal gain range for the Q channel. See “[I/Q Gain Ranges](#)” on [page 694](#). The Q Range only applies to Input Path Q Only and Ind I/Q. For input I+jQ the I Range determines both I and Q channel range settings.

Key Path	AMPTD Y Scale, Range
Remote Command	[:SENSE] :VOLTage:IQ:Q:RANGe[:UPPer] <voltage> [:SENSE] :VOLTage:IQ:Q:RANGe[:UPPer]?
Preset	1 V Peak
State Saved	Saved in instrument state.
Range	1 V Peak 0.5 V Peak 0.25 V Peak 0.125 V Peak
Dependencies/Couplings	When Q Same as I is On, the I Range value will be copied to the Q Range and the range value keys are disabled. Changing the value will also set Range = Man.
Remote Command Notes	The numeric entries are mapped to the smallest gain range whose break point is greater than or equal to the value, or 1 V Peak if the value is greater than 1 V. The Q Range is only used for Input Path Q Only and Ind I/Q. For input I+jQ the I Range determines both I and Q channel range settings.

AMPTD Y Scale (Amplitude Y Scale)

Example Set the Q Range to 0.5 V Peak
VOLT:IQ:Q:RANG 0.5 V

Instrument S/W Revision A.01.60 or later

This is an alternate form of the SCPI command to allow entry as a power.

Remote Command: [:SENSE]:POWER:IQ:Q:RANGE[:UPPER] <amp1>
[:SENSE]:POWER:IQ:Q:RANGE[:UPPER]?

Preset: 10.0 dBm

Range: -20 dBm to 10 dBm

Min: -20 dBm

Max: 10 dBm

Remote Command Notes: The POWER form of the command is provided for convenience. It maps to the same underlying gain range parameter as the VOLTage form of the command.

The Reference Z (not the Q channel Input Z) is used to convert the power to peak voltage, which is then used to set the Q Range as with the VOLTage form of the command. The power values of the 4 range states (1V Peak, 0.5V Peak, 0.25V Peak, and 0.125V Peak) will vary with Reference Z. Here are some examples:

50Ω 10, 4, -2, -8

75Ω 8.2, 2.2, -3.8, -9.8

600Ω -0.8, -6.8, -12.8, -18.9

Example: Will set the Q Range to 0.5 V Peak when Reference Z is 50Ω, and to 1.0 V Peak when Reference Z is 75Ω

POW:IQ:Q:RANG 4 dBm

Instrument S/W Revision: A.01.60 or later

I/Q Gain Ranges

1 V Peak Set the channel gain state to 1 Volt Peak.

Key Path **AMPTD Y Scale, I Range | Q Range**

Instrument S/W Revision A.01.60 or later

0.5 V Peak Set the channel gain state to 1 Volt Peak.

Key Path **AMPTD Y Scale, I Range | Q Range**

Instrument S/W Revision A.01.60 or later

0.25 V Peak Set the channel gain state to 1 Volt Peak.

Key Path	AMPTD Y Scale, I Range Q Range
Instrument S/W Revision	A.01.60 or later

0.125 V Peak Set the channel gain state to 1 Volt Peak.

Key Path	AMPTD Y Scale, I Range Q Range
Instrument S/W Revision	A.01.60 or later

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, then perform centering on the marker's center frequency.

A number of considerations should be observed to ensure proper operation:

If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency.

There is no preselector for signals below about 3.6 GHz

The preselector can be bypassed (see **Input/Output, Preselector On/Off**). If it is bypassed, no centering will be attempted in that range (error 229).

When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASure command. Note further that if the box is in a measurement such as averaging when this happens, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.

Remote Command: [:SENSe]:POWer[:RF]:PCENter

Example: POW:PCEN

AMPTD Y Scale (Amplitude Y Scale)

- Dependencies/Couplings:
- Grayed out if microwave preselector is off (see **Input/Output, Microwave Preselector On/Off**)
 - If the selected marker's frequency is below Band 1, advisory message is generated and no action is taken.
 - Grayed out if entirely in Band 0.
 - Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in such models, it generates an error.
 - Active marker position determines where the centering will be attempted.

Remote Command Notes: Note that the rules outlined above under the key description apply for the remote command as well as the key. Hence, the result of the command is dependent on marker position, etc. Any message shown by the key press is also shown in response to the remote command.

Key Path:

AMPTD

SCPI Status Bits/OPC
Dependencies:

The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.

Instrument S/W Revision: A.01.60 or later

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when **Presel Center** is available (see **Presel Center**, above), that is, the same gray-out rules apply.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

Preselector Adjust is a Meas Global parameter.

Remote Command: [:SENSe]:POWer[:RF]:PADJust <freq>
[:SENSe]:POWer[:RF]:PADJust?

Example:	POW:PADJ 100KHz POW:PADJ?
Dependencies/Couplings:	<ul style="list-style-type: none"> • Grayed out if microwave preselector is off (see Input/Output, Microwave Preselector On/Off) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it generates an error.
Preset:	0 MHz
State Saved:	The Presel Adjust value set by Presel Center , or by manually adjusting Presel Adjust , is not saved in Instrument State, and does not survive Preset or power cycle.
Min:	-500 MHz
Max:	500 MHz
Key Path:	AMPTD
Default Unit:	Hz
Instrument S/W Revision:	A.01.60 or later
Remote Command:	<pre>[:SENSE] :POWer [:RF] :PADJust :PRESelector MWAVe MMWave EXTernal [:SENSe] :POWer [:RF] :PADJust :PRESelector?</pre>
Remote Command Notes:	<pre>[:SENSe] :POWer [:RF] :PADJust :PRESelector MWAVe MMWave EXTernal</pre> <p>where: MWAV = 3–26 GHz MMWave = 26–50 GHz EXTernal = External</p> <p>Preselector Selection - PSA had multiple preselectors, and you could select which preselector to center. Since MXA will have only one preselector, the preselector selection key will no longer be available. However, in order to provide backward compatibility, we will support the remote command.</p> <p>The command form is a NOP</p> <p>The query will return MWAVe</p>

AMPTD Y Scale (Amplitude Y Scale)

Instrument S/W Revision: A.01.60 or later

Internal Preamp

Accesses keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

Preamp on/off and Preamp Band are Meas Global parameters.

Remote Command: [:SENSe]:POWer[:RF]:GAIN[:STATe] OFF|ON|0|1
[:SENSe]:POWer[:RF]:GAIN[:STATe]?

Dependencies/Couplings: Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown.
The preamp is not available when the electronic attenuator is enabled.

Preset: OFF
State Saved: Saved in state
Key Path: **AMPTD**
Instrument S/W Revision: A.01.60 or later

Remote Command: [:SENSe]:POWer[:RF]:GAIN:BAND LOW|FULL
[:SENSe]:POWer[:RF]:GAIN:BAND?

Dependencies/Couplings: Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown.
If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an “Option not installed” message is generated.

Preset: LOW
State Saved: Saved in state
Key Path: **AMPTD, Internal Preamp**
Instrument S/W Revision: A.01.60 or later

Off

Turns the internal preamp off

Example: :POW:GAIN OFF

Key Path: **AMPTD, Internal Preamp**

Instrument S/W Revision: A.01.60 or later

Low Band

Sets the internal preamp to use only the low band (0–3 GHz)

Example: :POW:GAIN ON

:POW:GAIN:BAND LOW

Key Path: **AMPTD, Internal Preamp**

Instrument S/W Revision: A.01.60 or later

Full Range

Sets the internal preamp to use its full range. The low band (0–3 GHz) is supplied by the low band preamp and the frequencies above 3.6 GHz are supplied by the high band preamp.

The instrument compensates for the preamp gain(s) as it sweeps. For the value of “Int Preamp Gain” in the Ref Level equations, we assume a preamp gain of 20 dB in Low Band Preamp mode and 35 dB in Full Range preamp mode. These gain rules are not dependent on start and stop frequencies. These gains are the maximum gain of the preamp hardware; we will always have the same or less actual gain, providing clipping margin.

The frequency range of the installed (optional) preamp is displayed in square brackets on the key label. If the high band option is not installed the Full Range key does not appear.

Example: :POW:GAIN ON

:POW:GAIN:BAND FULL

Key Path: **AMPTD, Internal Preamp**

Instrument S/W Revision: A.01.60 or later

AMPTD Y Scale (Amplitude Y Scale)

FREQ Channel

The Frequency front panel key accesses the keys to control frequency or channel settings.

Most Frequency features are unique to each Measurement. The keys listed in this section are common to most measurements. See the specific Measurement for more information.

Key Path	Front panel key
Instrument S/W Revision	A.01.60 or later

Center Frequency

Sets the frequency that corresponds to the horizontal center of the graticule (for the normal setup where Frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is **Center Freq**.

The **Center Frequency** setting is the same for all measurements within a **Mode**. Some modes are also able to share a global **Center Frequency** value; if this is the case, the **Mode** will have a **Global Settings** key in its **Mode Setup** menu.

If your analyzer has multiple inputs, the Center Freq function sets (and queries) the Center Frequency for the currently selected input. If you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

FREQ Channel

See “RF Center Freq” on page 703

See “I/Q Center Freq” on page 704

See “Center Frequency Presets” on page 703

Remote Command	<code>[:SENSE] :FREQUENCY:CENTer <freq></code> <code>[:SENSE] :FREQUENCY:CENTer?</code>
Default Unit	Hz
Dependencies/Couplings	<p>When operating in “swept span”, any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer’s frequency range</p> <p>The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop hit their limit.</p> <p>If the electrical attenuator is enabled, any attempt to set Center Frequency such that the Stop Frequency would be >3.6 GHz results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “–221, Settings conflict” warning.</p>
Example	<code>FREQ:CENT 50 MHz</code> <code>FREQ:CENT UP</code> changes the center frequency to 150 MHz if you use <code>FREQ:CENT:STEP 100 MHz</code> to set the center frequency step size to 100 MHz <code>FREQ:CENT?</code>
Instrument S/W Revision	A.01.60 or later
Key Path	FREQUENCY, Center Freq
Mode	BASIC, GSM, WIMAXOFDMA, WCDMA
Scope	Meas Global
Notes	<p>This command sets either the RF or I/Q Center Frequency depending on the selected input.</p> <p>For RF input it is equivalent to <code>FREQ:RF:CENT</code></p> <p>For I/Q input it is equivalent to <code>FREQ:IQ:CENT</code></p> <p>Preset and Max values are dependant on Hardware Options (503, 508, 513, 526)</p>
Preset	<p>Depends on instrument maximum frequency, mode, measurement, and selected input.</p> <p>See “Center Frequency Presets” on page 703, “RF Center Freq” on page 703 and “I/Q Center Freq” on page 704.</p>
State Saved	Saved in State

Min	Depends on instrument maximum frequency, mode, measurement, and selected input. See “Center Frequency Presets” on page 703, “RF Center Freq” on page 703 and “I/Q Center Freq” on page 704.
Max	Depends on instrument maximum frequency, mode, measurement, and selected input. See “Center Frequency Presets” on page 703, “RF Center Freq” on page 703 and “I/Q Center Freq” on page 704.
Test MIN/MAX/DEF	Yes
Status Bits/OPC Dependencies	non-overlapped
Instrument S/W Revision	A.01.60 or later

Center Frequency Presets

The following table provides the Center Frequency Presets for the various modes.

Freq Option	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
503	1.805 GHz	3.6 GHz	3.7 GHz
507	3.505 GHz	7.0 GHz	7.1 GHz
508	4.205 GHz	8.4 GHz	8.5 GHz
513	6.805 GHz	13.6 GHz	13.8 GHz
526	13.255 GHz	26.5 GHz	27.0 GHz

RF Center Freq

SCPI command for specifying the RF Center Frequency. This will always access the RF value, even when the selected input is not RF. The front panel always uses the Freq Center (Selected Input).

Remote Command	[:SENSE] :FREQuency:RF:CENTer <freq> [:SENSe] :FREQuency:RF:CENTer?
Example	FREQ:RF:CENT 30 MHz
Instrument S/W Revision	A.01.60 or later
Mode	All
Scope	Meas Global
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.

FREQ Channel

Preset	See table above
State Saved	Saved in instrument state.
Min	-79.999995 MHz
Max	See table above. Basically instrument maximum frequency – 10 Hz minimum span. If the knob or step keys are being used, depends on the value of the other three interdependent parameters
Test MIN/MAX/DEF	Yes

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This will always access the I/Q value, even when the selected input is not I/Q. The front panel always uses the Freq Center (Selected Input).

Remote Command	<code>[:SENSe] :FREQuency:IQ:CENTer <freq></code> <code>[:SENSe] :FREQuency:IQ:CENTer?</code>
Example	FREQ:IQ:CENT: 30 MHz
Instrument S/W Revision	A.01.60 or later
Mode	BASIC, GSM, WIMAX OFDMA, WCDMA
Scope	Meas Global
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Preset	0 Hz
State Saved	Saved in instrument state.
Min	-39.999995 MHz
Max	39.999995 MHz
Test MIN/MAX/DEF	Yes

CF Step

CF Step changes the step size for the center frequency and start/stop frequency functions. Once a step size has been selected and the center frequency function is active, the step keys (and the UP|DOWN parameters for Center Frequency from remote commands) change center frequency by the step-size value. The step size function is useful for finding harmonics and sidebands beyond the current frequency span of the analyzer.

Note that the Start and Stop frequencies also step by CF Step. It could be called Freq Step, but since Start

and Stop are rarely stepped, the legacy name “CF Step” best describes the key’s main use.

Remote Command	<pre>[:SENSE] :FREQuency:CENTer:STEP [:INCRement] <freq> [:SENSE] :FREQuency:CENTer:STEP [:INCRement] ? [:SENSE] :FREQuency:CENTer:STEP:AUTO OFF ON 0 1 [:SENSE] :FREQuency:CENTer:STEP:AUTO?</pre>
Default Unit	Hz
Dependencies/Couplings	<p>When auto-coupled in a non-zero span, the center frequency step size is set to 10% of the span. When auto-coupled in zero span, the center frequency step size is set to the equivalent –3 dB RBW value.</p> <p>Span, RBW, Center frequency</p> <p>If the electrical attenuator is enabled, any attempt to change the value of the center frequency >3.6 GHz by pressing the Up-arrow key, results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “–221, Settings conflict” warning.</p>
Example	<pre>FREQ:CENT:STEP:AUTO ON FREQ:CENT:STEP 500 MHz FREQ:CENT UP increases the current center frequency value by 500 MHz FREQ:CENT:STEP? FREQ:CENT:STEP:AUTO?</pre>
SCPI Status Bits/OPC Dependencies	non-overlapped
Instrument S/W Revision	A.01.60 or later
Key Path	FREQUENCY, CF Step
Mode	SA, TDSCDMA, ADEMOD, VSA, WCDMA
Notes	Preset and Max values are dependant on Hardware Options (503, 508, 513, 526)
Preset	<p>Auto</p> <p>ADEMOD: 1 MHz</p> <p>ON</p>
State Saved	Saved in State
Min	– (the maximum frequency of the instrument). (i.e. 27 GHz max freq instrument has a CF step range of +/- 27 GHz)
Max	the maximum frequency of the instrument. (i.e. 27 GHz max freq instrument has a CF step range of +/- 27 GHz)
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

FREQ Channel

Marker

Some Marker operation is 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 Marker key accesses the Marker menu. A marker can be placed on a trace to allow the value of the trace at the marker point to be determined precisely. The functions in this menu include a 1-of-N selection of the control mode Normal, Delta, Fixed, or Off for the selected marker. If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules.

Markers may also be used in pairs to read the difference (or delta) between two data points. They can be used in Marker Functions to do advanced data processing, or to specify operating points in functions like Signal Track and N dB Points.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Marker

Marker Function

Some Marker Functions 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 Marker Function key opens up a menu of keys that allow you to control the Marker Functions of the instrument. Marker Functions perform post-processing operations on marker data. Band Functions are Marker Functions that allow you to define a band of frequencies around the marker. The band defines the region of data used for the numerical calculations. These marker functions also allow you to perform mathematical calculations on trace and marker data and report the results of these calculations in place of the normal marker result.

Unlike regular markers, marker function markers are not placed directly on the trace. They are placed at a location which is relative to the result of the function calculation.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Marker Function

Marker To

Some Marker operation is 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.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Marker To

Meas

The information in this section is common to all measurements. For key and remote command information on each measurement, refer to the section which 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:

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
Instrument S/W Revision	A.01.60 or later

Remote Measurement Functions

This section contains the following topics:

[“Measurement Group of Commands” on page 714](#)

[“Current Measurement Query \(Remote Command Only\)” on page 717](#)

[“Limit Test Current Results \(Remote Command Only\)” on page 718](#)

[“Data Query \(Remote Command Only\)” on page 718](#)

[“Calculate/Compress Trace Data Query \(Remote Command Only\)” on page 718](#)

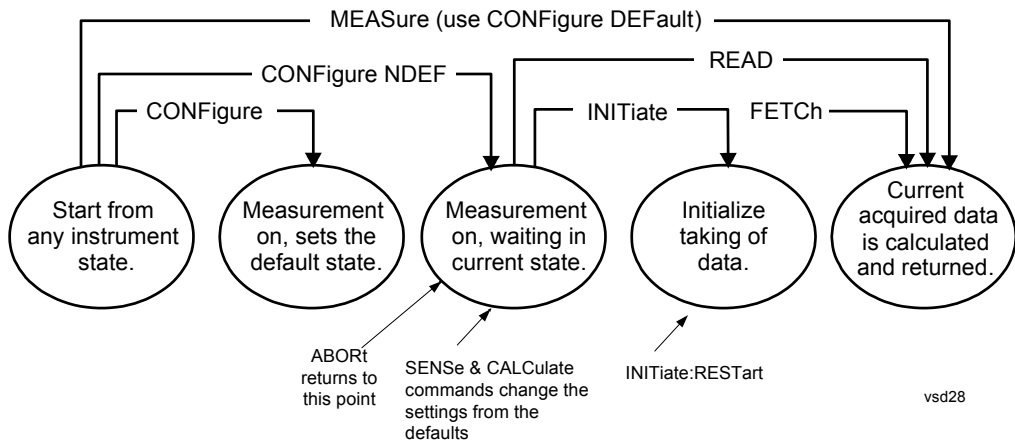
[“Calculate Peaks of Trace Data \(Remote Command Only\)” on page 724](#)

[“Format Data: Numeric Data \(Remote Command Only\)” on page 726](#)

[“Format Data: Byte Order \(Remote Command Only\)” on page 728](#)

Instrument S/W Revision	A.01.60 or later
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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 (for example, 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 result are 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 are 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:NDEFault<measurement> 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.

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 does not change to a different measurement. An error 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 are 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 are 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 switches 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 changes from channel power to ACP and initiates 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 initiates 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 initiates 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 switches 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 changes from channel power back to ACP and, using the previous ACP settings, initiates 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 are returned. If the [n] value is set to a value other than 1, the selected trace data results are 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)

Instrument S/W Revision A.01.60 or later

Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

Remote Command: :CONFigure?

Meas

Example: CONF?
Instrument S/W Revision: A.01.60 or later

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.

Instrument S/W Revision: A.01.60 or later

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.

Instrument S/W Revision: A.01.60 or later

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>]]]]

Remote Command 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.

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.)

Instrument S/W Revision: A.01.60 or later

- **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 returns 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 (x,y pair) 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 (x,y pair) 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.

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)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i \quad \text{vsd27-1}$$

where X_i 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)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i| \quad \text{vsd27-2}$$

where $|X_i|$ 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)

$$\text{DME} = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} \frac{X_i}{10} \right) \quad \text{vsd27-3}$$

- **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.

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)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2} \quad \text{vsd27-4}$$

where X_i 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)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*} \quad \text{vsd27-5}$$

where X_i is the complex value representation of an I/Q pair, X_i^* 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)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2} \quad \text{vsd27-7}$$

where X_i is a data point value, \bar{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).

Meas

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

vsd27-8

where $|X_i|$ is the magnitude of an I/Q pair, \bar{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:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

vsd27-9

where X_i is the complex value representation of an I/Q pair, X_i^* 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:

$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

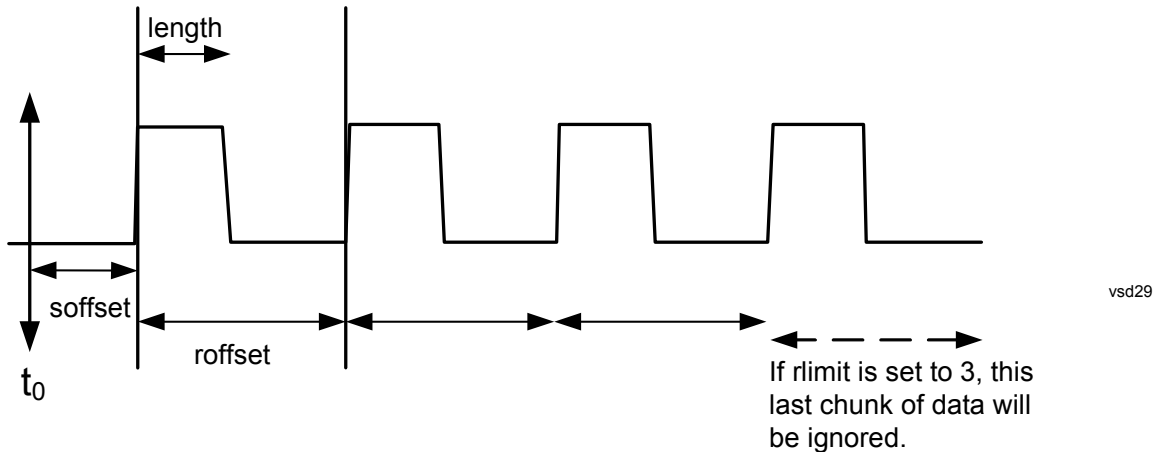
vsd27-10

where Y_i 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.

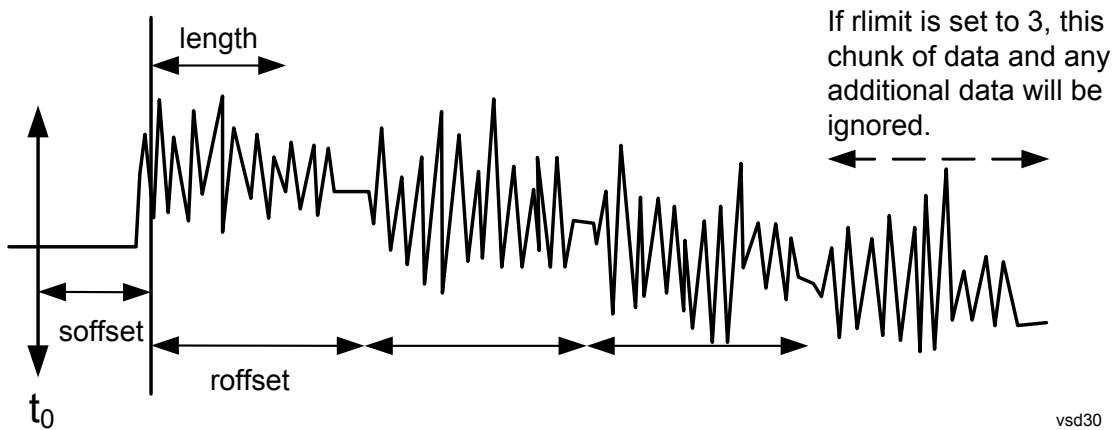
Sample Trace Data - Constant Envelope

(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 | 3 | 4 | 5 | 6 :PEAKs?
<threshold>, <excursion> [, AMPLitude | FREQuency | TIME [, ALL |
GTDLine | LTDLine]]
```

For most other measurements:

```
:CALCulate:DATA[1] | 2 | 3 | 4 | 5 | 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).

Dependencies/Couplings:

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 reported.

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.

Sorting 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.

Instrument S/W Revision: A.01.60 or later

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]?
```

Remote Command Notes:	<p>The query response is:</p> <p>ASCii: ASC,8</p> <p>REAL,32: REAL,32</p> <p>REAL,64: REAL,64</p> <p>INTeger,32: INT,32</p> <p>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).</p> <p>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.</p> <p>The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.</p>
Dependencies/Couplings:	<p>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).</p> <p>Sending data to the analyzer which does not conform to the current FORMat specified, results in an error.</p>
Preset:	ASCii
Instrument S/W Revision:	A.01.60 or later

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
Instrument S/W Revision:	A.01.60 or later

Mode

The Mode key allows you to select the available measurement applications. The application software must be loaded and license for it to be available. Measurement applications are a collection of measurement capabilities packaged together to provide an instrument personality that is specific to your measurement needs. Each mode software product is ordered separately by Model Number. The default measurement mode is the first listing in the menu.

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.

A list of the valid mode choices is returned with the INST:CAT? Query.

Once an instrument mode is selected, only the commands that are valid for that mode can be executed.

Key Path	Mode
Remote Command	:INSTrument [:SElect] SA BASIC ADEMOD NFIGURE PNOISE CDMA2K TDSCDMA VSA VSA89 601 WCDMA WIMAXOFDMA GSM CDMA1XEV RLC :INSTrument [:SElect] ?
Example	:INST SA
Remote Command 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. Once an instrument mode is selected, only the commands that are valid for that mode can be executed.
Preset	Not affected by Preset. Set to SA following Restore System Defaults, if SA is the default mode.
State Saved	Saved in state
Instrument S/W Revision	A.01.60 or later

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.

Mode	:INSTRument:NSElect <integer>	:INSTRument[:SElect] <parameter>
Spectrum Analyzer	1	SA
I/Q Analyzer (Basic)	8	BASIC
WCDMA with HSDPA/HSUPA	9	WCDMA
cdma2000	10	CDMA2K
GSM & EDGE	13	EDGE GSM
Phase Noise	14	PNOISE
1xEV-DO	15	CDMA1XEV
802.16 OFDMA (WiMAX/WiBro)	75	WIMAXOFDMA
Vector Signal Analyzer	100	VSA
89601 VSA	101	VSA89601
LTE	102	LTE
TD-SCDMA with HSPA/8PSK	211	TDSCDMA
Noise Figure	219	NFIGURE
Analog Demod	234	ADEMODO
Remote Language Compatibility	266	RLC
Instrument S/W Revision	A.01.60 or later	

Remote Command: :INSTRument:NSElect <integer>
:INSTRument:NSElect?

Example: :INST:NSEL 1

Remote Command 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 state
Instrument S/W Revision:	A.01.60 or later

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?
Remote Command Notes:	Query returns a quoted string of the installed and licensed modes separated with a comma. Example: "SA,PNOISE,WCDMA"
Instrument S/W Revision:	A.01.60 or later

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

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

Remote Command:	:SYSTem:APPLication[:CURRent] [:NAME]?
Example:	:SYST:APPL?
Remote Command Notes:	Query returns a quoted string which 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 Save is done.
Instrument S/W Revision:	A.01.60 or later

Current Application Revision

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

Remote Command: :SYSTem:APPLication[:CURRent]:REVision?

Example: :SYST:APPL:REV?

Remote Command Notes: Query returns a quoted string which 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 Preset

State Saved: Not saved in state, the value will be the selected application when Save is done.

Instrument S/W Revision: A.01.60 or later

Current Application Options

Returns a string which is the Options list of the currently selected application (mode).

Remote Command: :SYSTem:APPLication[:CURRent]:OPTion?

Remote Command Notes: Query returns a quoted string which 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 Preset

State Saved: Not saved in state per se, value will be the selected application when Save is invoked

Example: :SYST:APPL:OPT?

Instrument S/W Revision: A.01.60 or later

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

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 state.
Instrument S/W Revision:	A.01.60 or later

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?
Remote Command 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 Preset
State Saved:	Not saved in state.
Instrument S/W Revision:	A.01.60 or later

Application Catalog Revision

Returns the Revision of the provided Model Number.

Remote Command:	:SYSTem:APPLication:CATalog:REVision? <model>
Example:	:SYST:APPL:CAT:REV? 'N9060A'
Remote Command 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 Preset
State Saved:	Not saved in state.

Mode

Instrument S/W Revision: A.01.60 or later

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'

Remote Command 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 Preset

State Saved: Not saved in state.

Instrument S/W Revision: A.01.60 or later

Spectrum Analyzer

Selects the Spectrum Analyzer mode for general purpose measurements. There are several measurements available in this mode. General spectrum analysis measurements, in swept and zero span, can be done using the first key in the Meas menu, labeled Swept SA. Other measurements in the Meas Menu are designed to perform specialized measurement tasks, including power and demod measurements.

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 SA

INST:NSEL 1

Instrument S/W Revision A.01.60 or later

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
Instrument S/W Revision	A.01.60 or later

Phase Noise

The Phase Noise mode provides pre-configured measurements for making general purpose measurements of device phase noise.

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 PNOISE or INST:NSEL 14
Instrument S/W Revision	A.01.60 or later

Noise Figure

The Noise Figure mode provides pre-configured measurements for making general purpose measurements of device noise figure.

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 NFIGURE Or INST:NSEL 219
Instrument S/W Revision	A.01.60 or later

Remote Language Compatibility

The Remote Language Compatibility (RLC) mode provides remote command backwards compatibility for the 8560 series of spectrum analyzers, known as legacy spectrum analyzers.

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 RLC Or INST:NSEL 266
Instrument S/W Revision	A.01.60 or later

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
Instrument S/W Revision	A.01.60 or later

W-CDMA with HSDPA/HSUPA

Selects the W-CDMA with HSDPA/HSUPA 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
Instrument S/W Revision	A.01.60 or later

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
Instrument S/W Revision	A.01.60 or later

GSM with EDGE

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
Instrument S/W Revision	A.01.60 or later

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
Instrument S/W Revision	A.01.60 or later

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

Mode

re-access Help.

Key Path	Mode
Example	INST:SEL TDSCDMA INST:NSEL 211
Instrument S/W Revision	A.01.60 or later

Vector Signal Analyzer

The 89601X Vector Signal Analyzer (VSA) provides vector-signal analysis measurement capability. It provides 3 main measurements that allow you to measure the signal quality of all varieties of RF modulation:

- Digital Demodulation
- Analog Demodulation
- Vector Signal Analysis

There are advanced modulation analysis and troubleshooting capabilities including the following communications formats: AM, FM, PM, WiMAX, W-CDMA, 2G, 3G, 3.5G, WLAN, digital video, and more. It also provides standard-specific measurements for analysis of iDEN, WiDEN, and MotoTalk signals with Option H09.

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
Instrument S/W Revision	A.01.60 or later

89601 VSA

Selecting the 89601 VSA mode will start the 89600-Series VSA software application. 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 the R&D engineer. Reach deeper into signals, gather more data on signal problems, and gain greater insight.

- Over 30 general-purpose analog and digital demodulators ranging from 2FSK to 1024QAM
- Standards specific modulation analysis including:
 - Cell: GSM, cdma2000, WCDMA, TD-SCDMA and more
 - Wireless networking: 802.11a/b/g, 802.11n, 802.16 WiMAX (fixed/mobile), UWB

- 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
- Six 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/89600

To learn more about how to use the 89600 VSA running in the MXA, after the 89600 VSA application is running, open the 89600 VSA Help and open the "About Agilent X-Series Signal Analyzers (MXA/EXA) with 89600-Series Software" help topic.

Key Path	Mode
Example	INST:SEL VSA89601 INST:NSEL 101
Instrument S/W Revision	A.01.60 or later

LTE

Selects the LTE 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 LTE INST:NSEL 102
Instrument S/W Revision	A.01.60 or later

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

Mode

re-access Help.

Key Path	Mode
Example	INST:SEL CDMA1XEV INST:NSEL 15
Instrument S/W Revision	A.01.60 or later

Mode Setup

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 which 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.

Scope	Mode Global
Remote Command	:INSTRUMENT:COUPLE:FREQUENCY:CENTER ALL NONE :INSTRUMENT:COUPLE:FREQUENCY:CENTER?
Preset	Off
Preset	Set to Off on Global Settings, Restore Defaults and System, Restore Defaults, All Modes
Key Path	Mode Setup, Global Settings

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.

Remote Command	:INSTRUMENT:COUPLE:DEFAULT
Key Path	Mode Setup, Global Settings

Peak Search

Pressing the Peak Search key displays the Peak Search menu and places the selected marker on the trace point with the maximum y-axis value for that marker's trace. The Peak Search features allow you to define specific search criteria to determine which signals can be considered peaks, excluding unwanted signals from the search.

If **Same as "Next Peak" Criteria** is selected, and either **Pk Excursion** or **Pk Threshold** are on, a signal must meet those criteria. If no valid peak is found, a message is generated and the marker is not moved. When **Highest Peak** is on, or both **Pk Excursion** and **Pk Threshold** are off, the marker is always placed at the point on the trace with the maximum y-axis value, even if that point is on the very edge of the trace (exception: negative frequencies and signals close to the LO are not searched at all).

NOTE The peak threshold default setting may not be useful for every situation and that the actual value used must be derived from the actual measured power spectral density such that the threshold is above the noise but below the lowest peak that needs to be identified by NEXT RIGHT or other peak search functions.

Pressing Peak Search with the selected marker off causes the selected marker to be set to **Normal** at the center of the screen, then a peak search is immediately performed.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Source

This mode does not have any Source control functionality.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Source

Trigger

The Trig front-panel key accesses a menu of keys to control the selection of the trigger source and the setup of each of the trigger sources. The analyzer is designed to allow triggering from a number of different sources, for example, Free Run, Video, External, RF Burst, etc.

The TRIG:SOURce command (below) will specify the trigger source for the currently selected input (RF or I/Q). If you change inputs, the new input remembers the trigger source it was last programmed to for the current measurement, and uses that trigger source. You can directly set the trigger source for each input using the TRIGger:RF:SOURce and TRIGger:IQ:SOURce commands (later in this section).

Note the inclusion of the <measurement> parameter in the command below. Because each measurement remembers its own Trigger Source, the command must be qualified with the measurement name. Note that for the Swept SA measurement this is not the case; for backwards compatibility, no <measurement> parameter is used when setting the Trigger Source for the Swept SA measurement.

See [“Trigger Source Presets” on page 748](#)

See [“RF Trigger Source” on page 751](#)

See [“I/Q Trigger Source” on page 752](#)

See [“More Information” on page 753](#)

Key Path	Front-panel key
Remote Command	:TRIGger:<measurement>[:SEQuence]:SOURce EXTerna11 EXTerna12 IMMediate LINE FRAMe RFBurst VIDeo IF ALARm LAN IQMag IDEMod QDEMod IINPut QINPut AIQMag :TRIGger:<measurement>[:SEQuence]:SOURce?
Example	TRIG:ACP:SOUR EXT1 Selects the external 1 trigger input for the ACP measurement and the selected input TRIG:SOUR VID Selects video triggering for the SANalyzer measurement in the Spectrum Analyzer mode. For SAN, do not use the <measurement> keyword.

Trigger

Remote Command Notes	<p>Not all measurements have all the trigger sources available to them. Check the trigger source documentation for your specific measurement to see what sources are available.</p> <p>Not all trigger sources are available for each input. See the “RF Trigger Source” on page 751 and “I/Q Trigger Source” on page 752 commands (below) for detailed information on which trigger sources are available for each input.</p> <p>Other trigger-related commands are found in the INITiate and ABORt SCPI command subsystems.</p> <p>*OPC should be used after requesting data. This will hold off any subsequent changes to the selected trigger source, until after the sweep is completed and the data is returned.</p> <p>Available ranges and presets can vary from mode to mode.</p>
Preset	See table below
SCPI Status Bits/OPC Dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Instrument S/W Revision	A.01.60 or later

Trigger Source Presets

Here are the Trigger Source Presets for the various measurements:

Meas	Mode	Preset for RF	Preset for IQ	Notes
Swept SA	SA	IMM	IQ not supported	
CHP	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB	IMM	IQ not supported	

OBW	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO	1xEVDO: EXT1 others: IMM	IQ not supported	For 1xEVDO mode, the trigger source is coupled with the gate state, as well as the gate source. When the trigger source changes to RFBurst, External1 or External2, the gate state is set to on, and the gate source is set identically with the trigger source. When the trigger source changes to IMMEDIATE, VIDEO, LINE, FRAME or IF, the gate state is set to off.
CCDF	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB	SA, WCDMA, C2K: IMMEDIATE WIMAX OFDMA : RFBurst TD-SCDMA: BTS: External 1 MS: RFBurst	TD-SCDMA: BTS: External 1 MS: IQMAG Others: IMM	For TD-SCDMA: Trigger source is coupled with radio device. When radio device changes to BTS, trigger source will be changed to EXTERNAL1. When radio device changes to MS, trigger source will be set as RFBurst for RF or IQ Mag for BBIQ. When Trigger Source is RFBurst or IQ Mag, Measure Interval is grayed out.
ACP	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB	IMM	IQ not supported	
Tx Power	SA, GSM, TD-SCDMA	SA, GSM: RFBurst TD-SCDMA: EXTERNAL	IMM	TD-SCDMA doesn't support the Line and Periodic Timer parameters. When the mode is TD-SCDMA, if the Radio Device is switched to BTS, the value will be changed to External 1 and if the Radio device is switched to MS, the value will be changed to RFBurst
SPUR	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO	IMM	IQ not supported	

Trigger

SEM	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO	SA, WCDMA, C2K, TD-SCDMA, WIMAX OFDMA: IMMEDIATE 1xEVDO(BTS): EXTERNAL	IQ not supported	
CDP	WCDMA	IMM		
RHO	WCDMA	IMM		
PCON	WCDMA	IMM		
QPSK	WCDMA, C2K, 1xEVDO	All except CDMA 1xEVDO: IMMEDIATE CDMA 1xEVDO: EXT1		
MON	All except SA and BASIC	IMM	IQ not supported	
WAV		All except GSM/EDGE: IMMEDIATE GSM/EDGE: RFBURST	IQMAG	
PVT	WIMAX OFDMA	RFB	IMM	
EVM	WIMAX OFDMA	IMM	IMM	
SPEC	BASIC	IMM	IMM	
LOG Plot	PN	IMM	IQ not supported	
Spot Freq	PN	IMM	IQ not supported	
GMSK PVT	EDGE/GSM	RFB	IMM	
GMSK PFER	EDGE/GSM	RFB	IQMAG	
GMSK ORFS	EDGE/GSM	RFB	IQ not supported	
EDGE PVT	EDGE/GSM	RFB	IMM	
EDGE EVM	EDGE/GSM	RFB	IQMAG	
EDGE ORFS	EDGE/GSM	RFB	IQ not supported	

Combine d WCDMA	WCDMA	IMM	IQ not supported	
Combine d GSM	EDGE/GSM	RFB	IQ not supported	
List Power Step	WCDMA, EDGE/GSM	IMM	IQ not supported	

RF Trigger Source

The **RF Trigger Source** command (below) selects the trigger to be used for the specified measurement when RF is the selected input. The RF trigger source can be queried and changed even while another input is selected, but it is inactive until RF becomes the selected input.

Note the inclusion of the <measurement> parameter in the command below. Because each measurement remembers its own Trigger Source, the command must be qualified with the measurement name. Note that for the Swept SA measurement this is not the case; for backwards compatibility, no <measurement> parameter is used when setting the Trigger Source for the Swept SA measurement.

Remote Command: :TRIGger:<measurement>[:SEQuence]:RF:SOURce
 EXTerna11|EXTerna12|IMMediate|LINE|FRAME|RFBurst|VIDeo|
 IF|ALARm|LAN
 :TRIGger:<measurement>[:SEQuence]:RF:SOURce?

Example: TRIG:ACP:RF:SOUR EXT1
 Selects the external 1 trigger input for the ACP measurement and the RF input
 TRIG:RF:SOUR VID
 Selects video triggering for the SANalyzer measurement and the RF input.
 For SAN, do not use the <measurement> keyword.

Trigger

Remote Command Notes: Not all measurements have all the trigger sources available to them. Check the trigger source documentation for your specific measurement to see what sources are available.

Not all trigger sources are available for each input. For the **RF Trigger Source**, the following trigger sources are available:

- IMMEDIATE - free run triggering
- VIDEO - triggers on the video signal level
- LINE - triggers on the power line signal
- EXTERNAL1 - triggers on an externally connected trigger source on the rear panel
- EXTERNAL2 - triggers on an externally connected trigger source on the front panel
- RFBURST - triggers on the bursted frame
- FRAME - triggers on the periodic timer
- IF (video) - same as video, for backwards compatibility only
- ALARM – LXI Alarm
- LAN – LXI LAN event

*OPC should be used after requesting data. This will hold off any subsequent changes to the selected trigger source, until after the sweep is completed and the data is returned.

Available ranges, and presets can vary from mode to mode.

SCPI Status Bits/OPC Dependencies:

The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.

Instrument S/W Revision: A.01.60 or later

I/Q Trigger Source

The **I/Q Trigger Source** command (below) selects the trigger to be used for the specified measurement when I/Q (which requires option BBA) is the selected input. The I/Q trigger source can be queried and changed even while another input is selected, but it is inactive until I/Q becomes the selected input.

Remote Command: :TRIGger:<measurement>[:SEQUENCE]:IQ:SOURce
EXTernal1|EXTernal2|IMMEDIATE|IQMag|IDEMod|QDEMod|IINPu
t|QINPut|AIQMag
:TRIGger:<measurement>[:SEQUENCE]:IQ:SOURce?

Example: TRIG:WAVEform:SOUR IQM
Selects I/Q magnitude triggering for the IQ Waveform measurement and the I/Q input

Remote Command Notes: Not all measurements have all the trigger sources available to them. Check the trigger source documentation for your specific measurement to see what sources are available.

Not all trigger sources are available for each input. For the **I/Q Trigger Source**, the following trigger sources are available:

- IMMEDIATE - free run triggering
- EXTERNAL1 - triggers on an externally connected trigger source on the rear panel
- EXTERNAL2 - triggers on an externally connected trigger source on the front panel
- IQMAG - triggers on the magnitude of the I/Q signal
- IDEMOD - triggers on the I/Q signal's demodulated I voltage
- QDEMOD - triggers on the I/Q signal's demodulated Q voltage
- IINPUT - triggers on the I channel's ADC voltage
- QINPUT - triggers on the Q channel's ADC voltage
- AIQMAG - triggers on the magnitude of the auxiliary receiver channel I/Q signal

*OPC should be used after requesting data. This will hold off any subsequent changes to the selected trigger source, until after the sweep is completed and the data is returned.

Available ranges, and presets can vary from mode to mode.

SCPI Status Bits/OPC Dependencies:

The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.

Instrument S/W Revision: A.01.60 or later

More Information

The trigger menus let you select the trigger source and trigger settings for a sweep or measurement. In triggered operation (basically, any trigger source other than Free Run), the analyzer will begin a sweep or measurement only with the selected trigger conditions are met, generally when your trigger source signal meets the specified trigger level and polarity requirements. (In FFT measurements, the trigger controls when the data acquisition begins for FFT conversion.)

For each of the trigger sources, you may define a set of operational parameters or settings which will be applied when that source is selected as the current trigger source. Examples of these settings are Trigger Level, Trigger Delay, and Trigger Slope. You may apply different settings for each source; so, for example, you could have a Trigger Level of 1v for External 1 trigger and -10 dBm for Video trigger.

Once you have established the settings for a given trigger source, they generally will remain unchanged for that trigger source as you go from measurement to measurement within a Mode (although the settings do change as you go from Mode to Mode). Furthermore, the trigger settings within a Mode are the same

Trigger

for the **Trigger** menu, the **Gate Source** menu, and the **Sync Source** menu that is part of the **Periodic Timer Trigger Setup** menu. That is, if **Ext1** trigger level is set to 1v in the **Trigger** menu, it will appear as 1v in both the **Gate Source** and the **Sync Source** menus. For these reasons the trigger settings commands are not qualified with the measurement name, the way the trigger source commands are.

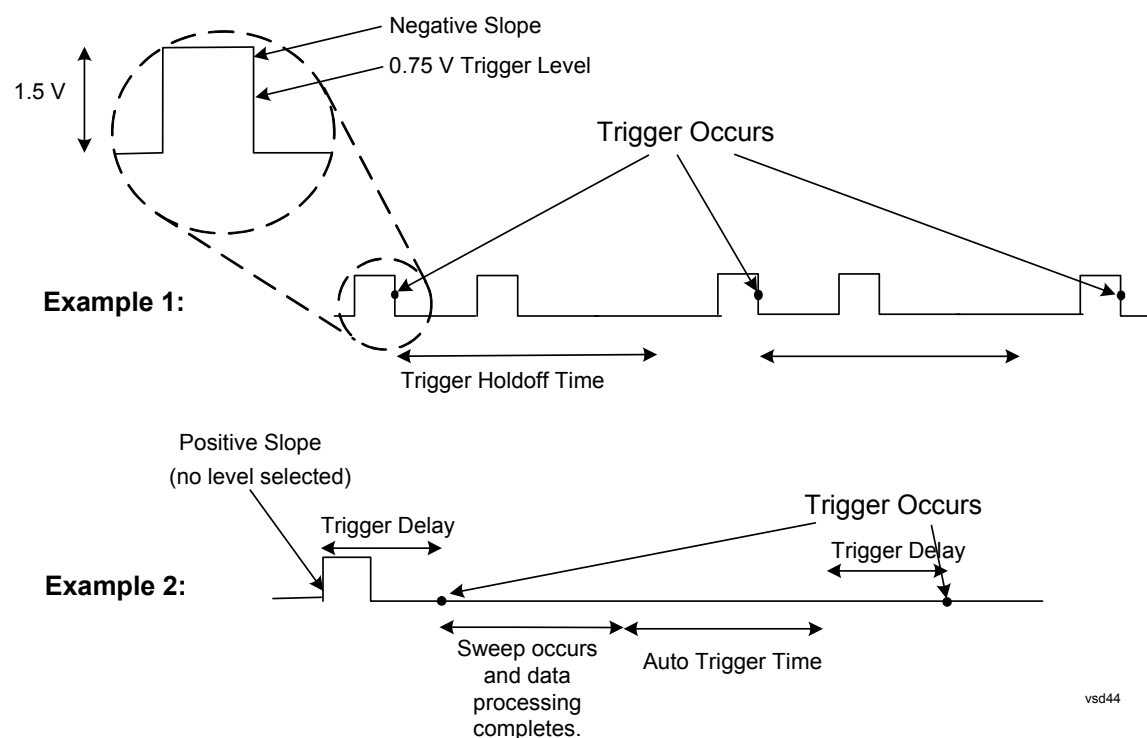
The settings setup menu can be accessed by pressing the key for the current trigger source a second time. For example, one press of Video selects the Video trigger as the source. The Video key becomes highlighted and the hollow arrow on the key turns black. Now a second press of the key takes you into the Video Trigger Setup menu.

Trigger Setup Parameters:

The following examples show trigger setup parameters using an external trigger source.

Example 1 illustrates the trigger conditions with negative slope and no trigger occurs during trigger Holdoff time.

Example 2 illustrates the trigger conditions with positive slope, trigger delay, and auto trigger time.



Free Run

Pressing this key, when it is not selected, selects free-run triggering. Free run triggering occurs immediately after the sweep/measurement is initiated.

Example: TRIG:SOUR IMM Swept SA measurement
TRIG:<meas>:SOUR IMM Measurements other than Swept SA

State Saved: Saved in instrument state.

Key Path:	Trig
SCPI Status Bits/OPC Dependencies:	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Instrument S/W Revision:	A.01.60 or later

Video (IF Envelope)

Pressing this key, when it is not selected, selects the video signal as the trigger. The Video trigger condition is met when the video signal (the filtered and detected version of the input signal, including both RBW and VBW filtering) crosses the video trigger level.

When the detector selected for all active traces is the average detector, the video signal for triggering does not include any VBW filtering.

The video trigger level is shown as a labeled line on the display. The line is displayed as long as video is the selected trigger source.

Pressing this key, when it is already selected, accesses the video trigger setup functions.

Example:	TRIG:SOUR VID Swept SA measurement TRIG:<meas>:SOUR VID Measurements other than Swept SA
Dependencies/Couplings:	Video trigger is allowed in average detector mode.
State Saved:	Saved in instrument state.
Key Path:	Trig
Notes:	Log Plot and Spot Frequency measurements do not support Video Trigger
SCPI Status Bits/OPC Dependencies:	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Instrument S/W Revision:	A.01.60 or later

Trigger Level

Sets a level for the video signal trigger. When the video signal crosses this level, with the chosen slope, the trigger occurs. This level is displayed with a horizontal line only if **Video** is the selected trigger

Trigger

source.

Remote Command:	:TRIGger [:SEquence] :VIDeo:LEVel <ampl> :TRIGger [:SEquence] :VIDeo:LEVel?
Example:	TRIG:VID:LEV -40 dBm
Dependencies/Couplings:	This same level is used for the Video trigger source in the Trigger menu and for the Video selection in the Gate Source menu. The range of the Video Trigger Level is dependent on the Reference Level.
Preset:	Set the Video Trigger Level -25 dBm on Preset. When the Video Trigger Level becomes the active function, if the value is off screen, set it to either the top or bottom of screen, depending on which direction off screen it was.
State Saved:	Saved in instrument state.
Min:	Same as reference level
Max:	Same as reference level
Key Path:	Trig, Video
Default Unit:	depends on the current selected Y axis unit
Instrument S/W Revision:	A.01.60 or later

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Remote Command:	:TRIGger [:SEquence] :VIDeo:SLOPe POSitive NEGative :TRIGger [:SEquence] :VIDeo:SLOPe?
Example:	TRIG:VID:SLOP NEG
Preset:	POSitive
State Saved:	Saved in instrument state.
Key Path:	Trig, Video
Instrument S/W Revision:	A.01.60 or later

Trig Delay

Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT, but not in swept

spans.

Remote Command: :TRIGger[:SEQuence]:VIDeo:DELAy <time>
 :TRIGger[:SEQuence]:VIDeo:DELAy?
 :TRIGger[:SEQuence]:VIDeo:DELAy:STATe OFF|ON|0|1
 :TRIGger[:SEQuence]:VIDeo:DELAy:STATe?

Example: TRIG:VID:DEL:STAT ON
 TRIG:VID:DEL 100 ms

Preset: Off, 1 us

State Saved: Saved in instrument state.

Min: -150 ms

Max: +500 ms

Key Path: Trig, Video

Default Unit: s

Instrument S/W Revision: A.01.60 or later

Line

Pressing this key, when it is not selected, selects the line signal as the trigger. A new sweep/measurement will start synchronized with the next cycle of the line voltage. Pressing this key, when it is already selected, access the line trigger setup menu.

Example: TRIG:SOUR LINE Swept SA measurement
 TRIG:<meas>:SOUR LINE Measurements other than Swept SA

Dependencies/Couplings: Line trigger is not available when operating from a "dc power source", for example, when the instrument is powered from batteries.

State Saved: Saved in instrument state.

Key Path: Trig

SCPI Status Bits/OPC Dependencies: The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.

Instrument S/W Revision: A.01.60 or later

Trigger

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Remote Command:	<code>:TRIGger[:SEQuence]:LINE:SLOPe POSitive NEGative</code> <code>:TRIGger[:SEQuence]:LINE:SLOPe?</code>
Example:	<code>TRIG:LINE:SLOP NEG</code>
Preset:	POSitive
State Saved:	Saved in instrument state.
Key Path:	Trig, Line
Instrument S/W Revision:	A.01.60 or later

Trig Delay

Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT, but not in swept spans.

Remote Command:	<code>:TRIGger[:SEQuence]:LINE:DELay <time></code> <code>:TRIGger[:SEQuence]:LINE:DELay?</code> <code>:TRIGger[:SEQuence]:LINE:DELay:STATe OFF ON 0 1</code> <code>:TRIGger[:SEQuence]:LINE:DELay:STATe?</code>
Example:	<code>TRIG:LINE:DEL:STAT ON</code> <code>TRIG:LINE:DEL 100 ms</code>
Preset:	Off, 1.000 us
State Saved:	Saved in instrument state.
Min:	-150 ms
Max:	500 ms
Key Path:	Trig, Line
Default Unit:	S
Instrument S/W Revision:	A.01.60 or later

External 1

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 1 input connector on the rear panel.

Pressing this key, when it is already selected, accesses the external 1 trigger setup menu.

Example:	TRIG:SOUR EXT1 Swept SA measurement TRIG:<meas>:SOUR EXT1 Measurements other than Swept SA
State Saved:	Saved in instrument state.
Key Path:	Trig
SCPI Status Bits/OPC Dependencies:	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Instrument S/W Revision:	A.01.60 or later

Trigger Level

Sets the value where the external 1 trigger input will trigger a new sweep/measurement.

Remote Command:	:TRIGger[:SEQuence]:EXTernal1:LEVel <level> :TRIGger[:SEQuence]:EXTernal1:LEVel?
Example:	TRIG:EXT1:LEV 0.4 V
Dependencies/Couplings:	This same level is used for the Ext1 trigger source in the Trigger menu, for the Ext1 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext1 selection in the Gate Source menu.
Preset:	1.2 V
State Saved:	Saved in instrument state.
Min:	-5 V
Max:	5 V
Key Path:	Trig, External 1
Default Unit:	V
Instrument S/W Revision:	A.01.60 or later

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a

Trigger

falling edge.

Remote Command: :TRIGger[:SEquence]:EXTernal1:SLOPe POSitive|NEGative
:TRIGger[:SEquence]:EXTernal1:SLOPe?

Example: TRIG:EXT1:SLOP NEG

Dependencies/Couplings: This same slope is used in the Ext1 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu).

Preset: POSitive

State Saved: Saved in instrument state.

Key Path: Trig, External 1

Instrument S/W Revision: A.01.60 or later

Trig Delay

Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT, but not in swept spans.

Remote Command: :TRIGger[:SEquence]:EXTernal1:DELay <time>
:TRIGger[:SEquence]:EXTernal1:DELay?
:TRIGger[:SEquence]:EXTernal1:DELay:STATe OFF|ON|0|1
:TRIGger[:SEquence]:EXTernal1:DELay:STATe?

Example: TRIG:EXT1:DEL:STAT ON

TRIG:EXT1:DEL 100 ms

Preset: Off, 1.000 us

State Saved: Saved in instrument state.

Min: -150 ms

Max: +500 ms

Key Path: Trig, External 1

Default Unit: s

Instrument S/W Revision: A.01.60 or later

External 2

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 2 input connector. The external trigger 2 input connector is on the rear panel.

Pressing this key, when it is already selected, accesses the external 2 trigger setup menu.

Example:	TRIG:SOUR EXT2 Swept SA measurement TRIG:<meas>:SOUR EXT2 Measurements other than Swept SA
State Saved:	Saved in instrument state.
Key Path:	Trig
SCPI Status Bits/OPC Dependencies:	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Instrument S/W Revision:	A.01.60 or later

Trigger Level

Sets the value where the external 2 trigger input will trigger a new sweep/measurement.

Remote Command:	:TRIGger [:SEQuence] :EXTernal2 :LEVel :TRIGger [:SEQuence] :EXTernal2 :LEVel?
Example:	TRIG:EXT2:LEV 1.1 V
Dependencies/Couplings:	This same level is used for the Ext2 trigger source in the Trigger menu, for the Ext2 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext2 selection in the Gate Source menu.
Preset:	1.2 V
State Saved:	Saved in instrument state.
Min:	-5 V
Max:	5 V
Key Path:	Trig, External 2
Default Unit:	V
Instrument S/W Revision:	A.01.60 or later

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a

Trigger

falling edge.

Remote Command: :TRIGger[:SEQuence]:EXTernal2:SLOPe POSitive|NEGative
:TRIGger[:SEQuence]:EXTernal2:SLOPe?

Example: TRIG:EXT2:SLOP NEG

Dependencies/Couplings: This same slope is used in the Ext2 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu).

Preset: POSitive

State Saved: Saved in instrument state.

Key Path: Trig, External 2

Instrument S/W Revision: A.01.60 or later

Trig Delay

Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT, but not in swept spans.

Remote Command: :TRIGger[:SEQuence]:EXTernal2:DELay <time>
:TRIGger[:SEQuence]:EXTernal2:DELay?
:TRIGger[:SEQuence]:EXTernal2:DELay:STATe OFF|ON|0|1
:TRIGger[:SEQuence]:EXTernal2:DELay:STATe?

Example: TRIG:EXT2:DEL:STAT ON

TRIG:EXT2:DEL 100 ms

Preset: Off, 1.000 us

State Saved: Saved in instrument state.

Min: -150 ms

Max: 500 ms

Key Path: Trig, External 2

Default Unit: s

Instrument S/W Revision: A.01.60 or later

RF Burst (Wideband)

Pressing this key, when it is not selected, selects the RF Burst as the trigger. A new sweep/measurement will start when an RF burst envelope signal is identified from the signal at the RF Input connector.

Pressing this key, when it is already selected, accesses the RF Burst trigger setup menu.

Example:	TRIG:SOUR RFB	Swept SA measurement
	TRIG:<meas>:SOUR RFB	Measurements other than Swept SA
Key Path:	Trig	
State Saved:	Saved in instrument state.	
SCPI Status Bits/OPC Dependencies:	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.	

Instrument S/W Revision: A.01.60 or later

Trigger Level

Sets the trigger level for the RF burst envelope.

In some measurements, both absolute and relative burst trigger functions are available. When Relative is available, this key will display a toggle between **Abs** and **Rel** on the third line. When **Abs** is selected, the value on the key is the absolute trigger level; when **Rel** is selected, the value is the relative trigger level.

If no toggle appears on the key, the measurement only supports absolute trigger level.

The relative RF Burst trigger is implemented as follows:

The measurement starts with the absolute RF Burst trigger setting. If it can not get a trigger with that level, auto trigger fires and the acquisition starts anyway. After the acquisition, the measurement searches for the peak in the acquired waveform and saves it.

Now, in the next cycle of the measurement, the measurement determines a new absolute RF Burst level based on the peak value from the first measurement and the Relative RF Burst Trigger Level (always 0 or negative dB) set by you. The following formula is used:

absolute RF Burst level = peak level of the previous acquisition + relative RF Burst level

If the new absolute RF Burst level differs from the previous by more than 0.5 dB, the new level is sent to the hardware; otherwise it is not updated (to avoid slowing down the acquisition)

Trigger

Steps 2 and 3 repeat for subsequent measurements.

Remote Command: :TRIGger[:SEquence]:RFBurst:LEVel:ABSolute <ampl>
 :TRIGger[:SEquence]:RFBurst:LEVel:RELative <ampl>
 :TRIGger[:SEquence]:RFBurst:LEVel:ABSolute?
 :TRIGger[:SEquence]:RFBurst:LEVel:RELative?
 :TRIGger[:SEquence]:RFBurst:LEVel:TYPE
 ABSolute|RELative
 :TRIGger[:SEquence]:RFBurst:LEVel:TYPE?

Example: TRIG:RFB:LEV:ABS 10 dBm sets the trigger level of the RF burst envelope signal to the absolute level of 10 dBm.

Dependencies/Couplings: This same level is used for the RF Burst trigger source in the Trigger menu, for the RF Burst selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the RF Burst selection in the Gate Source menu.

Preset: Absolute: -20 dBm
 Relative: -6 dB
 GSM: -25 dB
 ABSolute

State Saved: Saved in instrument state.

Min: Absolute: -200 dBm
 Relative: -45 dB

Max: Absolute: 100 dBm
 Relative: 0 dB

Key Path: Trig, RF Burst

Default Unit: Absolute: depends on the current selected Y-Axis unit
 Relative: dB or dBc

Instrument S/W Revision: A.01.60 or later

Trigger Slope

It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Remote Command: :TRIGger[:SEquence]:RFBurst:SLOPe POSitive|NEGative
 :TRIGger[:SEquence]:RFBurst:SLOPe?

Example: TRIG:RFB:SLOP NEG

Dependencies/Couplings:	This same slope is used in the RF Burst selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu).
Preset:	POSitive
State Saved:	Saved in instrument state.
Key Path:	Trig, RF Burst
Instrument S/W Revision:	A.01.60 or later

Trig Delay

Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT, but not in swept spans.

Remote Command:

```
:TRIGger[:SEquence]:RFBurst:DElay <time>
:TRIGger[:SEquence]:RFBurst:DElay?
:TRIGger[:SEquence]:RFBurst:DElay:STATe OFF|ON|0|1
:TRIGger[:SEquence]:RFBurst:DElay:STATe?
```

Example:

```
TRIG:RFB:DEL:STAT ON
TRIG:RFB:DEL 100 ms
```

Preset:	Off, 1.000 us
State Saved:	Saved in instrument state.
Min:	-150 ms
Max:	500 ms
Key Path:	Trig, RF Burst
Default Unit:	s
Instrument S/W Revision:	A.01.60 or later

Periodic Timer (Frame Trigger)

Pressing this key, when it is not selected, selects the internal periodic timer signal as the trigger. Triggering occurrences are set by the **Period** parameter, which is modified by the **Sync Source** and **Offset**. Pressing this key, when it is already selected, accesses the periodic timer trigger setup functions.

If you do not have a sync source selected (it is Off), then the internal timer will not be synchronized with any external timing events.

Example:	TRIG:SOUR FRAM	Swept SA measurement
	TRIG:<meas>:SOUR FRAM	Measurements other than Swept SA
State Saved:	Saved in instrument state.	

Trigger

Key Path:	Trig
SCPI Status Bits/OPC Dependencies:	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Instrument S/W Revision:	A.01.60 or later

Periodic Timer Triggering:

This feature selects the internal periodic timer signal as the trigger. Trigger occurrences are set by the **Periodic Timer** parameter, which is modified by the **Sync Source** and **Offset**.

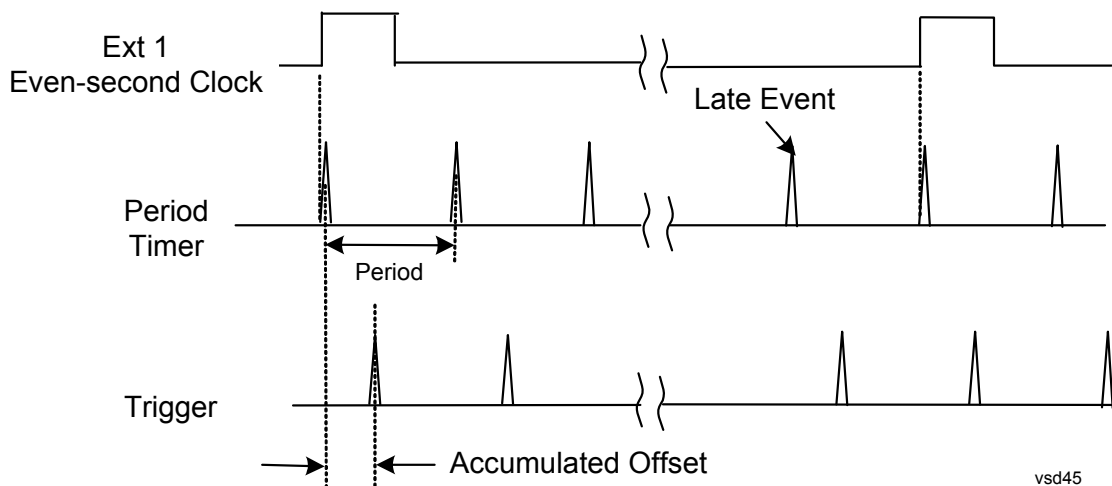
The figure below shows the action of the periodic timer trigger. Before reviewing the figure, we'll explain some uses for the periodic trigger.

A common application is measuring periodic burst RF signals for which a trigger signal is not easily available. For example, we might be measuring a TDMA radio which bursts every 20 ms. Let's assume that the 20 ms period is very consistent. Let's also assume that we do not have an external trigger source available that is synchronized with the period, and that the signal-to-noise ratio of the signal is not high enough to provide a clean RF burst trigger at all of the analysis frequencies. For example, we might want to measure spurious transmissions at an offset from the carrier that is larger than the bandwidth of the RF burst trigger. In this application, we can set the Periodic Timer to a 20.00 ms period and adjust the offset from that timer to position our trigger just where we want it. If we find that the 20.00 ms is not exactly right, we can adjust the period slightly to minimize the drift between the period timer and the signal to be measured.

A second way to use this feature would be to use **Sync Source** temporarily, instead of **Offset**. In this case, we might tune to the signal in a narrow span and use the RF Burst trigger to synchronize the periodic timer. Then we would turn the sync source off so that it would not mis-trigger. Mis-triggering can occur when we are tuned so far away from the RF burst trigger that it is no longer reliable.

A third example would be to synchronize to a signal that has a reference time element of much longer period than the period of interest. In some CDMA applications, it is useful to look at signals with a short periodicity, by synchronizing that periodicity to the "even-second clock" edge that happens every two seconds. Thus, we could connect the even-second clock trigger to Ext1 and use then Ext1 as the sync source for the periodic timer.

The figure below illustrates this third example. The top trace represents the even-second clock. It causes the periodic timer to synchronize with the leading edge shown. The analyzer trigger occurs at a time delayed by the accumulated offset from the period trigger event. The periodic timer continues to run, and triggers continue to occur, with a periodicity determined by the analyzer time base. The timer output (labeled "late event") will drift away from its ideal time due to imperfect matching between the time base of the signal being measured and the time base of the analyzer, and also because of imperfect setting of the period parameter. But the synchronization is restored on the next even-second clock event. ("Accumulated offset" is described in the in the **Offset** function section.)



Period

Sets the period of the internal periodic timer clock. For digital communications signals, this is usually set to the frame period of your current input signal. In the case that sync source is not set to OFF, and the external sync source rate is changed for some reason, the periodic timer is synchronized at the every external synchronization pulse by resetting the internal state of the timer circuit.

Remote Command: :TRIGger[:SEquence]:FRAME:PERiod <time>

:TRIGger[:SEquence]:FRAME:PERiod?

Example: TRIG:FRAM:PER 100 ms

Dependencies/Couplings: The invalid data indicator turns on when the period is changed, until the next sweep/measurement completes.

The same period is used in the Gate Source selection of the period timer.

Preset: 20 ms

GSM: 4.615383

State Saved: Saved in instrument state.

Min: 100.000 ns

Max: 559.0000 ms

Key Path: Trig, Periodic Timer

Default Unit: S

Instrument S/W Revision: A.01.60 or later

Offset

Adjusts the accumulated offset between the periodic timer events and the trigger event. Adjusting the accumulated offset is different than setting an offset, and requires explanation.

The periodic timer is usually not synchronized with any external events, so the timing of its output events has no absolute meaning. Since the timing relative to external events (RF signals) is important,

Trigger

you need to be able to adjust (offset) it. However, you have no direct way to see when the periodic timer events occur. All that you can see is the trigger timing. When you want to adjust the trigger timing, you will be changing the internal offset between the periodic timer events and the trigger event. Because the absolute value of that internal offset is unknown, we will just call that the accumulated offset. Whenever the Offset parameter is changed, you are changing that accumulated offset. You can reset the displayed offset using Reset Offset Display. Changing the display does not change the value of the accumulated offset, and you can still make additional changes to accumulated offset.

To avoid ambiguity, we define that an increase in the "offset" parameter, either from the RPG or the SCPI adjust command, serves to delay the timing of the trigger event.

Remote Command: :TRIGger [:SEQuence] :FRAMe:OFFSet <time>
:TRIGger [:SEQuence] :FRAMe:OFFSet?

Example: TRIG:FRAM:OFFS 1.2 ms

Dependencies/Couplings: The invalid data indicator turns on when the offset is changed, until the next sweep/measurement completes.

The same offset is used in the Gate Source selection of the period timer.

Remote Command Notes: When the SCPI command is sent the value shown on the key (and the Active Function, if this happens to be the active function) is updated with the new value. However, the actual amount sent to the hardware is the delta value, that is, the current accumulated offset value minus the previous accumulated offset value.

The SCPI query simply returns the value currently showing on the key.

Preset: 0 s

State Saved: Saved in instrument state.

Min: -10.000 s

Max: 10.000 s

Key Path: Trig, Periodic Timer

Default Unit: S

Instrument S/W Revision: A.01.60 or later

Offset Adjust (Remote Command only) This remote command does not work at all like the related front-panel keys. This command lets you advance the phase of the frame trigger by the amount you specify.

It does not change the period of the trigger waveform. If the command is sent multiple times, it advances the phase of the frame trigger an additional amount each time it is sent. Negative numbers are permitted.

Remote Command: :TRIGger [:SEQuence] :FRAMe:ADJust <time>

Example: TRIG:FRAM:ADJ 1.2 ms

Dependencies/Couplings:	The invalid data indicator turns on when the offset is changed, until the next sweep/measurement completes. The same offset is used in the Gate Source selection of the period timer.
Remote Command Notes:	The front panel interface (for example, the knob) and the :TRIG:FRAM:OFFS command adjust the accumulated offset, which is shown on the active function display. However, the actual amount sent to the hardware is the delta value, that is, the current offset value minus the previous offset value. When the SCPI command is sent the value shown on the key (and the Active Function, if this happens to be the active function) is updated by increasing it (or decreasing it if the value sent is negative) by the amount specified in the SCPI command. This is a "command only" SCPI command, with no query.
Preset:	0 s
State Saved:	Saved in instrument state.
Min:	-10.000 s
Max:	10.000 s
Default Unit:	S
Instrument S/W Revision:	A.01.60 or later

Reset Offset Display

Resets the value of the periodic trigger offset display setting to 0.0 seconds. The current displayed trigger location may include an offset value defined with the **Offset** key. Pressing this key redefines the currently displayed trigger location as the new trigger point that is 0.0 s offset. The **Offset** key can then be used to add offset relative to this new timing.

Remote Command:	:TRIGger [:SEquence] :FRAMe:OFFSet:DISPlay:RESet
Example:	TRIG:FRAM:OFFS:DISP:RES
Key Path:	Trig, Periodic Timer
Instrument S/W Revision:	A.01.60 or later

Sync Source

Selects a signal source for you to synchronize your periodic timer trigger to, otherwise you are triggering at some arbitrary location in the frame. Synchronization reduces the precision requirements on the setting of the period.

For convenience you may adjust the level and slope of the selected sync source in a conditional branch setup menu accessed from the Sync Source menu. Note that these settings match those in the **Trigger** and **Gate Source** menus; that is, each trigger source has only one value of level and slope, regardless of

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which menu it is accessed from.

Remote Command:	:TRIGger [:SEquence] :FRAMe:SYNC EXTernal1 EXTernal2 RFBurst OFF :TRIGger [:SEquence] :FRAMe:SYNC?
Example:	TRIG:FRAM:SYNC EXT2
Preset:	Off GSM/EDGE: RFBurst
State Saved:	Saved in instrument state.
Key Path:	Trig, Periodic Timer
Instrument S/W Revision:	A.01.60 or later

Off Turns off the sync source for your periodic trigger. With the sync source off, the timing will drift unless the signal source frequency is locked to the analyzer frequency reference.

Example:	TRIG:FRAM:SYNC OFF
Key Path:	Trig, Periodic Timer, Sync Source
Instrument S/W Revision:	A.01.60 or later

External 1 Pressing this key, when it is not selected, selects the external input port that you will use for the periodic trigger synchronization. Pressing this key, when it is already selected, accesses the external 1 sync source setup menu.

Example:	TRIG:FRAM:SYNC EXT
Dependencies/Couplings:	Same as External 1 trigger source.
Key Path:	Trig, Periodic Timer, Sync Source
Instrument S/W Revision:	A.01.60 or later

External 2 Pressing this key, when it is not selected, selects the external input port that you will use for the periodic frame trigger synchronization.

Pressing this key, when it is already selected, accesses the external 2 sync source setup menu.

Example:	TRIG:FRAM:SYNC EXT2
Dependencies/Couplings:	Same as External 2 trigger source.
Key Path:	Trig, Periodic Timer, Sync Source
Instrument S/W Revision:	A.01.60 or later

RF Burst (Wideband) Pressing the key once selects the RF burst envelope signal to be used for the periodic timer trigger synchronization.

Press the key a second time to access the RF burst sync source setup menu.

Example:	TRIG:FRAM:SYNC RFB
Dependencies/Couplings:	Same as RF Burst trigger source.
Key Path:	Trig, Periodic Timer, Sync Source
Instrument S/W Revision:	A.01.60 or later

Trig Delay

This setting delays the measurement timing relative to the Periodic Timer.

Remote Command:	:TRIGger[:SEquence]:FRAME:DELAy <time> :TRIGger[:SEquence]:FRAME:DELAy? :TRIGger[:SEquence]:FRAME:DELAy:STATe OFF ON 0 1 :TRIGger[:SEquence]:FRAME:DELAy:STATe?
Preset:	Off, 1.000 us
State Saved:	Saved in instrument state.
Min:	-150 ms
Max:	+500 ms
Key Path:	Trig, Periodic Timer
Default Unit:	s
Instrument S/W Revision:	A.01.60 or later

Sync Holdoff

Sync Holdoff specifies the duration that the sync source signal must be kept false before the transition to true to be recognized as the sync timing. The periodic timer phase is aligned when the sync source signal becomes true, after the Holdoff time is satisfied.

A holdoff of 2 ms will work with most WiMAX signals, but there may be cases where the burst off duration is less than 1 ms and this value will need to be changed.

Remote Command:	:TRIGger[:SEquence]:FRAME:SYNC:HOLDoff <time> :TRIGger[:SEquence]:FRAME:SYNC:HOLDoff? :TRIGger[:SEquence]:FRAME:SYNC:HOLDoff:STATe OFF ON 0 1 :TRIGger[:SEquence]:FRAME:SYNC:HOLDoff:STATe?
Preset:	On, 1.000 ms
State Saved:	Saved in instrument state.
Min:	0 ms

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Max:	+500 ms
Key Path:	Trig, Periodic Timer
Default Unit:	s
Instrument S/W Revision:	A.01.60 or later

LXI Trigger

Pressing this key when it is not selected selects the LXI system as the trigger. Pressing the key when it is already selected accesses the LXI trigger type selection menu, where either LAN Event or Alarm can be chosen. The key is annotated to display which of the two is currently selected.

TIP	For information about setting up measurements using LXI, refer to the Programmer's Guide located in your analyzer at: C:/Program Files/Agilent/Signal Analysis/Help/Bookfiles/x_series_prog.pdf. It is also available by selecting the "Additional Documentation" page of the Help.
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Instrument S/W Revision	A.01.60 or later
Key Path	Trig
Mode	SA, IQ (Basic)
Preset	ON
State Saved	Saved in instrument state.

LAN Event

Pressing this key when it is not selected selects the LAN event system as the LXI trigger. A new sweep/measurement starts when the pre-configured LAN message arrives if the LXI trigger is selected (see "LXI Trigger" on page 772). Pressing this key when it is already selected accesses the LAN trigger setup menu.

Pressing this button causes Enabled LXI Alarm Triggers to be ignored, since the Trigger source is changed to LXI LAN Event.

Example	TRIG:SOUR LAN Swept SA measurement TRIG:<meas>:SOUR LAN Measurements other than Swept SA
SCPI Status Bits/OPC Dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Instrument S/W Revision	A.01.60 or later
Key Path	Trig, LXI Trigger

Mode	SA, IQ (Basic)
Preset	ON
State Saved	Saved in instrument state.
State Saved	Saved in instrument state.

Disable All Sets the Enable parameter of every member of the LXI LAN Event list to OFF.

Remote Command	:TRIGger [:SEquence] :LXI:LAN:DISable:ALL
Example	:TRIG:LXI:LAN:DIS:ALL
Instrument S/W Revision	A.01.60 or later
Key Path	Trig, LXI Trigger, LAN Event
Mode	SA, IQ (Basic)

LAN Event List After selecting LAN as the trigger source, you is presented with a list of LXI Trigger LAN Events to be configured. By default, LAN0-LAN7 are available. Using the TRIG:LXI:LAN:ADD and TRIG:LXI:LAN:REM commands, the size of this list can be changed arbitrarily. Pressing a LAN event branches to that event's setup menu.

Remote Command	:TRIGger [:SEquence] :LXI:LAN:LIST?
Example	:TRIG:LXI:LAN:LIST? Returns the complete list of Trigger LAN Events which is, at minimum: "LAN0", "LAN1", "LAN2", "LAN3", "LAN4", "LAN5", "LAN6", "LAN7"
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, LAN Event
Mode	SA, IQ (Basic)
Preset	"LAN0", "LAN1", "LAN2", "LAN3", "LAN4", "LAN5", "LAN6", "LAN7"
State Saved	Saved in instrument state.

Detection Pressing this button brings up the Trigger Detection menu.

Selecting "Rise" causes the instrument to trigger on the receipt of a signal low LAN Event followed by a signal high LAN Event.

Selecting "Fall" caused the instrument to trigger on the receipt of a signal high LAN Event followed by a signal low LAN Event.

Selecting "High" causes the instrument to trigger on every signal high LAN Event.

Selecting "Low" causes the instrument to trigger on every signal low LAN Event.

Remote Command	:TRIGger [:SEquence] :LXI:LAN[:SET]:DETection "LANEVENT", HIGH LOW RISE FALL
-----------------------	--

Trigger

Example	:TRIG:LXI:LAN:DET "LAN0",HIGH
Restriction and Notes	If a non existent LAN event is passed in the lanEvent argument, the command is ignored
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, LAN Event, <lanEvent>
Mode	SA, IQ (Basic)
Preset	HIGH
State Saved	Saved in instrument state.
Range	HIGH LOW RISE FALL

Remote Command :TRIGger[:SEQuence]:LXI:LAN[:SET]:DETEction? "LANEVENT"

Example	:TRIG:LXI:LAN:DET? "LAN0"?
Restriction and Notes	If a non existent LAN event is passed in the lanEvent argument, the command is ignored
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, LAN Event, <lanEvent>
Mode	SA, IQ (Basic)
Preset	HIGH
State Saved	Saved in instrument state.
Range	HIGH LOW RISE FALL

Delay Sets the amount of delay that should pass between receiving a LXI Trigger LAN Event Trigger and the trigger action. A Delay of 0.0 s indicates that the instrument will trigger as soon as possible after receiving the proper LXI LAN Event.

Remote Command :TRIGger[:SEQuence]:LXI:LAN[:SET]:DELay "LANEVENT",<time>

Example	:TRIG:LXI:LAN:DEL "LAN0",5S
Instrument S/W Revision	A.01.60 or later
Key Path	Trig, LXI Trigger, LAN Event, <lanEvent>
Mode	SA, IQ (Basic)
Preset	0.0 s
State Saved	Saved in instrument state.
Range	0.0 – 1.7976931348623157 x 10308 (Max Double)

Remote Command :TRIGger[:SEQuence]:LXI:LAN[:SET]:DELay? "lanEvent"

Example	:TRIG:LXI:LAN:DEL? "LAN0"
Instrument S/W Revision	A.01.60 or later
Key Path	Trig, LXI Trigger, LAN Event, <lanEvent>
Mode	SA, IQ (Basic)
Preset	0.0 s
State Saved	Saved in instrument state.
Range	0.0 – 1.7976931348623157 x 10308 (Max Double)

Enabled/Disabled When the Trigger Source is set to LXI Trigger LAN Event, the instrument triggers upon receiving any event from the LXI Trigger LAN Event List whose Enabled parameter is set to ON.

If the Enabled parameter is set to OFF, the event is ignored.

Remote Command :TRIGger [:SEquence] :LXI:LAN[:SET] :ENABLEd
"LANEVENT" , ON|OFF|1|0

Example	:TRIG:LXI:LAN:ENAB "LAN0",ON
Instrument S/W Revision	A.01.60 or later
Key Path	Trig, LXI Trigger, LAN Event, <lanEvent>
Mode	SA, IQ (Basic)
Preset	OFF
State Saved	Saved in instrument state.
Range	OFF ON 0 1

Remote Command :TRIGger [:SEquence] :LXI:LAN[:SET] :ENABLEd? "LANEVENT"

Example	:TRIG:LXI:LAN:ENAB? "LAN0"
Instrument S/W Revision	A.01.60 or later
Key Path	Trig, LXI Trigger, LAN Event, <lanEvent>
Mode	SA, IQ (Basic)
Preset	OFF
State Saved	Saved in instrument state.
Range	OFF ON 0 1

Add (Remote Only) Adds the provided string to the list of possible LAN events to trigger on. As new LAN events are added, keys are generated in the LAN source menu. New key panels are generated as the number of possible LAN events increases past a multiple of six, and the "More" keys are updated to

Trigger

reflect the new number of key panels in the LAN source menu.

Mode	SA, IQ (Basic)
Remote Command	:TRIGger [:SEQuence] :LXI :LAN :ADD "LANEVENT"
Example	:TRIG:LXI:LAN:ADD "LANEVENT"
State Saved	No
Range	Uppercase, Lowercase, Numeric, Symbol except for comma or semicolon
Restriction and Notes	The maximum length of the string is 16 characters. Longer strings are concatenated to 16 characters and added. No event is added if the LAN Event already exists. This command modifies the LXI Trigger LAN Event List Parameter.
Instrument S/W Revision	A.01.60 or later

Remove (Remote Only) Removes the provided string from the list of possible LAN events to trigger on. As LAN events are removed, keys are removed from the LAN source menu. Key panels are removed as the number of possible LAN events decreases past a multiple of six, and the "More" keys are updated to reflect the new number of key panels in the LAN source menu. It is not possible to remove the "LAN0" – "LAN7" events.

Mode	SA, IQ (Basic)
Remote Command	:TRIGger [:SEQuence] :LXI :LAN :REMOve [:EVENT] "LANEVENT"
Example	:TRIG:LXI:LAN:REM "LANEVENT"
State Saved	No
Range	Uppercase, Lowercase, Numeric, Symbol except for comma or semicolon
Restriction and Notes	The maximum length of the string is 16 characters. Longer strings are concatenated and the corresponding LAN Event is removed. Nothing happens if the LAN event does not exist. This command modifies the LXI Trigger LAN Event List Parameter.
Instrument S/W Revision	A.01.60 or later

Remove All (Remote Only) Clears the list of customer added LAN events that can cause the instrument to trigger. Events LAN0-LAN7 are not affected. As LAN events are removed, keys are removed from the LAN source menu. Key panels are removed as the number of possible LAN events decreases past a multiple of six, and the "More" keys are updated to reflect the new number of key panels in the LAN source menu.

It is not possible to remove the "LAN0" – "LAN7" events.

Mode	SA, IQ (Basic)
Remote Command	:TRIGger [:SEquence] :LXI:LAN:REMove:ALL
Example	:TRIG:LXI:LAN:REM:ALL
Restriction and Notes	This command modifies the LXI Trigger LAN Event List Parameter.
Instrument S/W Revision	A.01.60 or later

Event Filter (Remote Only) Only LXI Trigger LAN Events coming from hosts matching the filter string are processed. There is no front panel access to this command

The syntax for specifying a filter is as follows:

Filter == ([host[:port]] | [ALL[:port]]) [,Filter]

Specifying an empty string means that LXI trigger packets are accepted as a Trigger from any port on any host on the network via either TCP or UDP.

Specifying only the port means that any host communicating over that port can send events.

Specifying ALL indicates that UDP multicast packets are accepted if they are directed to the Internet Assigned Numbers Authority (IANA) assigned multicast address on the IANA assigned default port, or the designated port if specified.

Examples:

"192.168.0.1:23"

"agilent.com, soco.agilent.com"

"agilent.com:80, 192.168.0.1"

Mode	SA, IQ (Basic)
Remote Command	:TRIGger [:SEquence] :LXI:LAN[:SET] :FILTer "LANEVENT", "filterString" :TRIGger [:SEquence] :LXI:LAN[:SET] :FILTer?
Example	:TRIG:LXI:LAN:FILT "LAN0","agilent.com" :TRIG:LXI:LAN:FILT?
Preset	"" (empty string)
State Saved	Saved in instrument state.
Range	Uppercase, Lowercase, Numeric, Symbol
Restriction and Notes	The maximum length of the string is 45 characters. Nothing happens if the LAN event does not exist.
Instrument S/W Revision	A.01.60 or later

Trigger

Count (Remote Only) Returns the number of items in the LXI Trigger LAN Event List.

Mode	SA, IQ (Basic)
Remote Command	:TRIGger[:SEquence]:LXI:LAN:COUNT?
Example	:TRIG:LXI:LAN:COUN?
Instrument S/W Revision	A.01.60 or later

Identifier (Remote Only) Sets the string that is expected to arrive over the LAN for a given Trigger LAN Event to occur. The Identifier is variable to allow for easier system debugging.

Mode	SA, IQ (Basic)
Remote Command	:TRIGger[:SEquence]:LXI:LAN[:SET]:IDENTifier "LANEVENT", "identifier" :TRIGger[:SEquence]:LXI:LAN[:SET]:IDENTifier? "LANEVENT"
Example	:TRIG:LXI:LAN:IDEN "LAN0","debugstring"
State Saved	Saved in instrument state.
Range	Uppercase, Lowercase, Numeric, Symbol
Restriction and Notes	The maximum length of the string is 16 characters. Nothing happens if the LAN event does not exist. The default value is that the identifier is equivalent to the name of the LAN Event.
Instrument S/W Revision	A.01.60 or later

Configure (Remote Only) Allows the configuration of some of the above parameters from a single SCPI command.

Mode	SA, IQ (Basic)
Remote Command	:TRIGger[:SEquence]:LXI:LAN[:SET]:CONFigure "lanEvent", <enable>, <detection>, <delay>, <filter>, <identifier>
Example	:TRIG:LXI:LAN:CONF "LAN0",1,FALL,0.0,"ALL","debugIdentifier"
Instrument S/W Revision	A.01.60 or later

Alarm

Pressing this key when it is not selected selects the alarm system as the LXI trigger. A new sweep/measurement starts when the configured IEEE 1588 time occurs if the LXI trigger is selected as the active trigger (see [“LXI Trigger” on page 772](#)). Pressing this key when it is already selected accesses the alarm source selection menu.

Example	TRIG:ACP:SOUR ALAR
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SCPI Status Bits/OPC Dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger
Mode	SA, IQ (Basic)
Preset	ON
State Saved	Saved in instrument state.

Disable All This key causes all Alarms in the trigger alarm list to go into the disabled state.

(Enabled = OFF)

Remote Command	:TRIGger [:SEQuence] :LXI:ALARm:DISable:ALL
Example	:TRIG:LXI:ALAR:DIS:ALL
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, Alarm
Mode	SA, IQ (Basic)

Alarm List After selecting Alarm as the trigger source, you is presented with a list of possible alarms. Pressing an alarm (for example, "ALARM0") branches to the alarm setup menu.

Remote Command	:TRIGger [:SEQuence] :LXI:ALARm:LIST?
Example	:TRIG:LXI:ALAR:LIST? Returns the complete list of Alarm events which is: "ALARM0"
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, Alarm
Mode	SA, IQ (Basic)
Preset	"ALARM0"
State Saved	Saved in instrument state.

Date/Time Absolute alarm time sets an alarm for one specific time using the date and time of day (for example, 12/14/2007 at 11:45:15.3456). The Date and Time are represented in the instrument's local time. This is the only way to set an alarm from the front panel.

Epoch time is another type of absolute alarm time. A specific time is identified by the number of seconds it occurs after January 1, 1970 00:00:00 in International Atomic Time (TAI). Epoch Time is time zone invariant. Epoch time is only set via remote; see "Epoch Time Value (Remote Only)" on page 782.

Trigger

The date and time the alarm is scheduled to go off is noted on the branch key.

The Epoch Time Second and Epoch Time Fraction are the ultimate source of alarm information. The Absolute Time and Date may be changed from the front panel without being applied. When querying the Absolute Time and Date parameters from SCPI, if the Absolute Time and Date have not been applied (and therefore do not match the Epoch Time Second and Epoch Time Fraction), the string "(epoch time not set)" is added to the return value.

Instrument S/W Revision A.01.60 or later

Key Path Trig LXI Trigger, Alarm, <alarmEvent>

Mode SA, IQ (Basic)

Remote Command :TRIGger[:SEQuence]:LXI:ALARm[:SET]:TIME[:VALue]:ABSolu
te "alarmEvent", "date", "time"

Example :TRIG:LXI:ALAR:TIME:ABS "ALARM0","2007/4/6", "15:45:02.123456"

Remote Command Notes "date" is a representation of the date the alarm should occur in the form of
"YYYY/MM/DD" where:
YYYY is the four digit representation of year. (for example, 2007)
MM is the two digit representation of month. (for example. 01 to 12)
DD is the two digit representation of day. (for example, 01 to 28, 29, 30, or 31
depending on the month and year)
"time" is a representation of the time of day the alarm should occur in the form
of "HH:MM:SS.SSSSSS" where:
HH is the two digit representation of the hour in 24 hour format
MM is the two digit representation of minute
SS.SSSSSS is a real representing seconds (for example 02.123456)

Instrument S/W Revision A.01.60 or later

Key Path Trig LXI Trigger, Alarm, <alarmEvent>,Time

Mode SA, IQ (Basic)

Preset Current date at initialization at 00:00:00.000000

State Saved Saved in instrument state.

Remote Command :TRIGger[:SEQuence]:LXI:ALARm[:SET]:TIME[:VALue]:ABSolu
te? "alarmEvent"

Example :TRIG:LXI:ALAR:TIME:ABS? "ALARM0"

This query returns data using the following format "YYYY/MM/DD
HH:MM:SS.SSSSSS" If the Absolute time has been changed from the front
panel, but has not been applied, the return value is of the form
"YYYY/MM/DD HH:MM:SS.SSSSSS (epoch time not set)".

Remote Command Notes	<p><date> is a representation of the date the alarm should occur in the form of YYYY/MM/DD where:</p> <p>YYYY is the four digit representation of year. (for example, 2007)</p> <p>MM is the two digit representation of month. (for example. 01 to 12)</p> <p>DD is the two digit representation of day. (for example, 01 to 28, 29, 30, or 31 depending on the month and year)</p> <p><time> is a representation of the time of day the alarm should occur in the form of HH:MM:SS.SSSSSS where:</p> <p>HH is the two digit representation of the hour in 24 hour format</p> <p>MM is the two digit representation of minute</p> <p>SS.SSSSSS is a real representing seconds (for example 02.123456)</p>
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, Alarm, <alarmEvent>,Time
Mode	SA, IQ (Basic)
Preset	Current date at initialization at 00:00:00.000000
State Saved	Saved in instrument state.

Date The date the alarm should occur. All absolute alarm time parameters are set using the same SCPI command; however they each have their own front panel control.

When setting alarm values from the front panel, the new alarm time is not registered with the alarm system until the "Set" key is pressed.

Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, Alarm, <alarmEvent>,Time
Mode	SA, IQ (Basic)
Preset	Current date
State Saved	Saved in instrument state.
Range	current date – 214748/12/31. Values representing a time in the past result in an error.

Time The time of the day, in the instrument's local time (this takes into account time zones and daylight savings time), the alarm should occur. This parameter is based on a 24 hour clock.

All absolute alarm time parameters are set using the same SCPI command; however they each have their own front panel control.

When setting alarm values from the front panel, the new alarm time is not registered with the alarm system until the

Trigger

"Set" key is pressed.

Restriction and Notes	Uses a 24 hour clock. Values representing a time in the past result in an error. Only valid time values are accepted. The <second> field accepts a decimal number, and is valid to the microsecond position. The <year>, <month>, <hour>, and <minute> fields all accept integers.
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, Alarm, <alarmEvent>,Time
Mode	SA, IQ (Basic)
Preset	00:00:00.000000
State Saved	Saved in instrument state.
Range	00:00:00.000000 – 23:59:59.999999

Apply (Front Panel Only) Causes the Absolute Alarm Time values to be converted into an Epoch time (see [“Epoch Time Value \(Remote Only\)” on page 782](#)), compared to the current time, and sent to the Alarm Trigger subsystem. This key can only be pressed when the epoch time and the absolute time are out of sync.

Restriction and Notes	Alarm times are settable to microsecond resolution.
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, Alarm, <alarmEvent>,Time
Mode	SA, IQ (Basic)

Epoch Time Value (Remote Only) Sets the LXI Alarm Time. This represents the number of seconds after January 1, 1970 00:00:00, in TAI time, that the alarm should go off.

Mode	SA, IQ (Basic)
Remote Command	:TRIGger[:SEQuence]:LXI:ALARm[:SET]:TIME[:VALue] "alarmEvent", <seconds>, <fractionalSeconds>
Example	:TRIG:LXI:ALAR:TIME "ALARM0",123456.0 S, 0.123456
Preset	Seconds: The number of whole seconds between Jan. 1, 1970 at 00:00:00 (in TAI time) and the current date at initialization at 00:00:00 (in TAI time) Fractional Seconds: 0
State Saved	Saved in instrument state.
Range	Seconds: Epoch time of current date at 00:00:00 (in TAI time) – 253402300800 + number of seconds local time zone offset from UTC Fractional Seconds: 0.0 – 0.999999

Restriction and Notes	Values representing a time in the past result in an error.
Instrument S/W Revision	A.01.60 or later
Mode	SA, IQ (Basic)
Remote Command	:TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue]?
Example	:TRIG:LXI:ALAR:TIME?
Preset	Seconds: The number of whole seconds between Jan. 1, 1970 at 00:00:00 (in TAI time) and the current date at initialization at 00:00:00 (in TAI time) Fractional Seconds: 0
State Saved	Saved in instrument state.
Range	Seconds: Epoch time of current date at 00:00:00 (in TAI time) – 253402300800 + number of seconds local time zone offset from UTC Fractional Seconds: 0.0 – 0.999999
Restriction and Notes	Values representing a time in the past result in an error.
Instrument S/W Revision	A.01.60 or later

Epoch Time Seconds (Remote only) Sets the seconds portion of the LXI Alarm time. This represents the number of seconds after January 1, 1970 00:00:00 (in TAI time) that the alarm should go off.

Values must be in the form of whole seconds; decimal values result in an error.

Mode	SA, IQ (Basic)
Remote Command	:TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME:SEConds "alarmEvent", <seconds>
Example	:TRIG:LXI:ALAR:TIME:SEC "ALARM0",123456.0 S
Preset	The number of whole seconds between Jan. 1, 1970 at 00:00:00 (in TAI time) and the current date at initialization at 00:00:00 (in TAI time)
State Saved	Saved in instrument state.
Range	Epoch time of current date at 00:00:00 (in TAI time) – 253402300800 + number of seconds local time zone offset from UTC
Restriction and Notes	Values representing a time in the past result in an error. Values containing a decimal portion result in an error.
Instrument S/W Revision	A.01.60 or later
Mode	SA, IQ (Basic)
Remote Command	:TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME:SEConds? "alarmEvent"
Example	:TRIG:LXI:ALAR:TIME:SEC "ALARM0"?

Trigger

Preset	The number of seconds between Jan. 1, 1970 at 00:00:00 (in TAI time) and the current date at initialization at 00:00:00 (in TAI time)
State Saved	Saved in instrument state.
Range	Epoch time of current date at 00:00:00 (in TAI time) – 253402300800 + number of seconds local time zone offset from UTC
Restriction and Notes	Values representing a time in the past result in an error. Values containing a decimal portion result in an error.
Instrument S/W Revision	A.01.60 or later

Epoch Time Fraction (Remote Only) Sets the sub-second value of the Epoch time.

Mode	SA, IQ (Basic)
Remote Command	:TRIGger[:SEQuence]:LXI:ALARm[:SET]:TIME[:VALue]:FRACti on "alarmEvent", <fractionalSeconds>
Example	:TRIG:LXI:ALAR:TIME:FRAC "ALARM0",0.123456 S
Preset	0
State Saved	Saved in instrument state.
Range	0.0 – 0.999999
Restriction and Notes	Values representing a time in the past result in an error.
Instrument S/W Revision	A.01.60 or later

Mode	SA, IQ (Basic)
Remote Command	:TRIGger[:SEQuence]:LXI:ALARm[:SET]:TIME[:VALue]:FRACti on? "alarmEvent"
Example	:TRIG:LXI:ALAR:TIME:FRAC "ALARM0"?
Preset	0
State Saved	Saved in instrument state.
Min	0.0
Max	0.999999
Restriction and Notes	Values representing a time in the past result in an error.
Instrument S/W Revision	A.01.60 or later

Relative Time (Remote Only) Sets the values of Epoch Time Seconds and Epoch Time Fraction by adding an offset to the time when the command is issued. For example, if the Relative Time command is issued with an argument of 60s, the alarm will occur 1 minute in the future.

Mode	SA, IQ (Basic)
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Remote Command :TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue]:RELati
ve "alarmEvent", <seconds>

Example :TRIG:LXI:ALAR:TIME:REL "ALARM0",60.0s

Range 0.0 – 1.7976931348623157 x 10308 (Max Double)

Instrument S/W Revision A.01.60 or later

Mode SA, IQ (Basic)

Remote Command :TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue]:RELati
ve? "alarmEvent"

Example :TRIG:LXI:ALAR:TIME:REL "ALARM0"?

Range 0.0 – 1.7976931348623157 x 10308 (Max Double)

Instrument S/W Revision A.01.60 or later

Period Sets the amount of time that should elapse between alarms in a repeating alarm trigger.

Remote Command :TRIGger[:SEquence]:LXI:ALARm[:SET]:PERiod
"alarmEvent", <seconds>

Example :TRIG:LXI:ALAR:PER "ALARM0",1.2345 s

Restriction and Notes A period of 0.0s effectively causes the trigger to occur only once, since all repetitions are fired simultaneously

Instrument S/W Revision A.01.60 or later

Key Path Trig LXI Trigger, Alarm, <alarmEvent>

Mode SA, IQ (Basic)

Preset 0.0 s

State Saved Saved in instrument state.

Range 0.0 – 1.7976931348623157 x 10308 (Max Double)

Remote Command :TRIGger[:SEquence]:LXI:ALARm[:SET]:PERiod?
"alarmEvent"

Example :TRIG:LXI:ALAR:PER "ALARM0"?

Restriction and Notes A period of 0.0s effectively causes the trigger to occur only once, since all repetitions are fired simultaneously

Instrument S/W Revision A.01.60 or later

Key Path Trig LXI Trigger, Alarm, <alarmEvent>

Mode SA, IQ (Basic)

Preset 0.0 s

Trigger

State Saved	Saved in instrument state.
Range	0.0 – 1.7976931348623157 x 10308 (Max Double)

Repetitions Sets the number of times a repeating alarm should fire once the initial alarm time has occurred.

Remote Command	:TRIGger [:SEQuence] :LXI :ALARm [:SET] :REPeat "alarmEvent" , <repetitions>
Example	:TRIG:LXI:ALAR:REP "ALARM0",10
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, Alarm, <alarmEvent>
Mode	SA, IQ (Basic)
Preset	1
State Saved	Saved in instrument state.
Range	1 – 2,147,483,647

Remote Command	:TRIGger [:SEQuence] :LXI :ALARm [:SET] :REPeat? "alarmEvent "
Example	:TRIG:LXI:ALAR:REP "ALARM0",10
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, Alarm, <alarmEvent>
Mode	SA, IQ (Basic)
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	2,147,483,647

Enabled If Enabled is set to ON and the trigger source is set to ALARm, this alarm causes the instrument to trigger.

If Enabled is set to OFF, this alarm is ignored

Remote Command	:TRIGger [:SEQuence] :LXI :ALARm [:SET] :ENABled "alarmEvent" , ON OFF 1 0
Example	:TRIG:LXI:ALAR:ENAB "ALARM0",ON
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, Alarm, <alarmEvent>
Mode	SA, IQ (Basic)

Preset	OFF
State Saved	Saved in instrument state.
Range	1 0
Remote Command	:TRIGger[:SEQuence]:LXI:ALARm[:SET]:ENABled? "alarmEvent"
Example	:TRIG:LXI:ALAR:ENAB "ALARM0"?
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, Alarm, <alarmEvent>
Mode	SA, IQ (Basic)
Preset	OFF
State Saved	Saved in instrument state.
Range	1 0

Configure (Remote Only) Allows the configuration of some of the above parameters from a single SCPI command.

Mode	SA, IQ (Basic)
Remote Command	:TRIGger[:SEQuence]:LXI:ALARm[:SET]:CONFIgure "alarmEvent", <enable>, <epochSeconds>, <epochFraction>, <period>, <repeat>
Example	:TRIG:LXI:ALAR:CONF "ALARM0",1,1000000.0,0.123456,1.2,3
Instrument S/W Revision	A.01.60 or later

Count (Remote Only) Returns the number of alarms in the LXI Trigger Alarm List.

Remote Command:	:TRIGger1 TRIGger[:SEQuence]:LXI:ALARm:COUNT?
Example:	:TRIG:LXI:ALAR:COUN?
Instrument S/W Revision:	A.01.60 or later

Baseband I/Q

Pressing this key when it is not selected selects Baseband I/Q as the trigger. Pressing the key when it is already selected accesses the Baseband I/Q trigger type selection menu. The key is annotated to display which of the Baseband I/Q trigger types is currently selected.

Instrument S/W Revision	A.01.60 or later
Key Path	Trig
Mode	SA, IQ (Basic)

Trigger

State Saved No

I/Q Mag

Pressing this key, when it is not selected, selects the I/Q magnitude signal as the trigger. The I/Q Magnitude trigger condition is met when the I/Q magnitude crosses the I/Q magnitude trigger level. The magnitude is measured at the output of the main I/Q digital receiver.

Key Path Trigger, Baseband I/Q
Example TRIG:<meas>:SOUR IQM
Instrument S/W Revision A.01.60 or later

Trigger Level Sets a level for the I/Q magnitude trigger. When the signal crosses this level, with the chosen slope, the trigger occurs. If the specific Measurement displays the signal from the chosen sampling point a green line will be displayed to indicate the trigger level.

Key Path Trigger, Baseband I/Q, I/Q Mag
Remote Command :TRIGger[:SEquence]:IQMag:LEVel <ampl >
:TRIGger[:SEquence]:IQMag:LEVel?
Preset -25 dBm
State Saved Saved in instrument state.
Range -200 dBm to 100 dBm
Remote Command Notes The I/Q reference impedance is used for converting between power and voltage.
Example TRIG:IQM:LEV -30 dBm
Instrument S/W Revision A.01.60 or later

Trig Slope Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path Trigger, Baseband I/Q, I/Q Mag
Remote Command :TRIGger[:SEquence]:IQMag:SLOPe POSitive | NEGative
:TRIGger[:SEquence]:IQMag:SLOPe?
Preset POSitive
State Saved Saved in instrument state.
Example TRIG:IQM:SLOP POS
Instrument S/W Revision A.01.60 or later

Trig Delay Controls a time delay during which the analyzer will wait to begin a sweep after meeting the

trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT.

Key Path	Trigger, Baseband I/Q, I/Q Mag
Remote Command	:TRIGger[:SEquence]:IQMag:DELay <time> :TRIGger[:SEquence]:IQMag:DELay? :TRIGger[:SEquence]:IQMag:DELay:STATe OFF ON 0 1 :TRIGger[:SEquence]:IQMag:DELay:STATe?
Preset	1 us OFF
State Saved	Saved in instrument state.
Range	-2.5 s to +10 s
Example	TRIG:IQM:DEL 10 ms TRIG:IQM:DEL:STAT ON
Instrument S/W Revision	A.01.60 or later

I (Demodulated)

Pressing this key, when it is not selected, selects the main receiver's output I voltage as the trigger. The I (Demodulated) trigger condition is met when the I voltage crosses the I voltage trigger level.

Key Path	Trigger, Baseband I/Q
Example	TRIG:<meas>:SOUR IDEM
Instrument S/W Revision	A.01.60 or later

Trigger Level Sets a level for the I (Demodulated) trigger. When the signal crosses this level, with the chosen slope, the trigger occurs. If the specific Measurement displays the signal from the chosen sampling point a green line will be displayed to indicate the trigger level.

Key Path	Trigger, Baseband I/Q, I (Demodulated)
Remote Command	:TRIGger[:SEquence]:IDEMod:LEVel <voltage> :TRIGger[:SEquence]:IDEMod:LEVel?
Preset	0.25 V
State Saved	Saved in instrument state.
Range	-1 to 1 V
Example	TRIG:IDEM:LEV 0.5 V
Instrument S/W Revision	A.01.60 or later

Trig Slope Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to

Trigger

trigger on a falling edge.

Key Path	Trigger, Baseband I/Q, I (Demodulated)
Remote Command	:TRIGger[:SEquence]:IDEMod:SLOPe POSitive NEGative :TRIGger[:SEquence]:IDEMod:SLOPe?
Preset	POSitive
State Saved	Saved in instrument state.
Example	TRIG:IDEM:SLOP POS
Instrument S/W Revision	A.01.60 or later

Trig Delay Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT.

Key Path	Trigger, Baseband I/Q, I (Demodulated)
Remote Command	:TRIGger[:SEquence]:IDEMod:DELay <time> :TRIGger[:SEquence]:IDEMod:DELay? :TRIGger[:SEquence]:IDEMod:DELay:STATe OFF ON 0 1 :TRIGger[:SEquence]:IDEMod:DELay:STATe?
Preset	1 us OFF
State Saved	Saved in instrument state.
Range	-2.5 s to +10 s
Example	TRIG:IDEM:DEL 10 ms TRIG:IDEM:DEL:STAT ON
Instrument S/W Revision	A.01.60 or later

Q (Demodulated)

Trigger Level Sets a level for the Q (Demodulated) trigger. When the signal crosses this level, with the chosen slope, the trigger occurs. If the specific Measurement displays the signal from the chosen sampling point a green line will be displayed to indicate the trigger level.

Key Path	Trigger, Baseband I/Q, Q (Demodulated)
Remote Command	:TRIGger[:SEquence]:QDEMod:LEVel <voltage> :TRIGger[:SEquence]:QDEMod:LEVel?
Preset	0.25 V
State Saved	Saved in instrument state.

Range	-1 to 1 V
Example	TRIG:QDEM:LEV 0.5 V
Instrument S/W Revision	A.01.60 or later

Trig Slope Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, Baseband I/Q, Q (Demodulated)
Remote Command	:TRIGger[:SEquence]:QDEMod:SLOPe POSitive NEGative :TRIGger[:SEquence]:QDEMod:SLOPe?
Preset	POSitive
State Saved	Saved in instrument state.
Example	TRIG:QDEM:SLOP POS
Instrument S/W Revision	A.01.60 or later

Trig Delay Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT.

Key Path	Trigger, Baseband I/Q, Q (Demodulated)
Remote Command	:TRIGger[:SEquence]:QDEMod:DELay <time> :TRIGger[:SEquence]:QDEMod:DELay? :TRIGger[:SEquence]:QDEMod:DELay:STATe OFF ON 0 1 :TRIGger[:SEquence]:QDEMod:DELay:STATe?
Preset	1 us OFF
State Saved	Saved in instrument state.
Range	-2.5 s to +10 s
Example	TRIG:QDEM:DEL 10 ms TRIG:QDEM:DEL:STAT ON
Instrument S/W Revision	A.01.60 or later

Input I

Pressing this key, when it is not selected, selects the I channel's ADC voltage as the trigger. The Input I trigger condition is met when the voltage crosses the trigger level.

Key Path	Trigger, Baseband I/Q
Example	TRIG:<meas>:SOUR IINP

Trigger

Instrument S/W Revision A.01.60 or later

Trigger Level Sets a level for the Input I trigger. When the signal crosses this level, with the chosen slope, the trigger occurs.

Key Path Trigger, Baseband I/Q, Input I

Remote Command :TRIGger[:SEQuence]:IINPut:LEVel <voltage>
 :TRIGger[:SEQuence]:IINPut:LEVel?

Preset 0.25 V

State Saved Saved in instrument state.

Range -1 to 1 V

Example TRIG:IINP:LEV 0.5 V

Instrument S/W Revision A.01.60 or later

Trig Slope Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path Trigger, Baseband I/Q, Input I

Remote Command :TRIGger[:SEQuence]:IINPut:SLOPe POSitive | NEGative
 :TRIGger[:SEQuence]:IINPut:SLOPe?

Preset POSitive

State Saved Saved in instrument state.

Example TRIG:IINP:SLOP POS

Instrument S/W Revision A.01.60 or later

Trig Delay Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT.

Key Path Trigger, Baseband I/Q, Input I

Remote Command :TRIGger[:SEQuence]:IINPut:DELaY <time>
 :TRIGger[:SEQuence]:IINPut:DELaY?
 :TRIGger[:SEQuence]:IINPut:DELaY:STATe OFF|ON|0|1
 :TRIGger[:SEQuence]:IINPut:DELaY:STATe?

Preset 1 us
 OFF

State Saved Saved in instrument state.

Range -2.5 s to +10 s

Example	TRIG:IINP:DEL 10 ms TRIG:IINP:DEL:STAT ON
Instrument S/W Revision	A.01.60 or later

Input Q

Pressing this key, when it is not selected, selects the Q channel's ADC voltage as the trigger. The Input Q trigger condition is met when the voltage crosses the trigger level.

Key Path	Trigger, Baseband I/Q
Example	TRIG:<meas>:SOUR QINP
Instrument S/W Revision	A.01.60 or later

Trigger Level Sets a level for the Input Q trigger. When the signal crosses this level, with the chosen slope, the trigger occurs.

Key Path	Trigger, Baseband I/Q, Input Q
Remote Command	:TRIGger[:SEquence]:QINPut:LEVel <voltage> :TRIGger[:SEquence]:QINPut:LEVel?
Preset	0.25 V
State Saved	Saved in instrument state.
Range	-1 to 1 V
Example	TRIG:QINP:LEV 0.5 V
Instrument S/W Revision	A.01.60 or later

Trig Slope Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, Baseband I/Q, Input Q
Remote Command	:TRIGger[:SEquence]:QINPut:SLOPe POSitive NEGative :TRIGger[:SEquence]:QINPut:SLOPe?
Preset	POSitive
State Saved	Saved in instrument state.
Example	TRIG:QINP:SLOP POS
Instrument S/W Revision	A.01.60 or later

Trig Delay Controls a time delay during which the analyzer will wait to begin a sweep after meeting the

Trigger

trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT.

Key Path	Trigger, Baseband I/Q, Input Q
Remote Command	:TRIGger [:SEquence] :QINPut:DELay <time> :TRIGger [:SEquence] :QINPut:DELay? :TRIGger [:SEquence] :QINPut:DELay:STATe OFF ON 0 1 :TRIGger [:SEquence] :QINPut:DELay:STATe?
Preset	1 us OFF
State Saved	Saved in instrument state.
Range	-2.5 s to +10 s
Example	TRIG:QINP:DEL 10 ms TRIG:QINP:DEL:STAT ON
Instrument S/W Revision	A.01.60 or later

Auxiliary Channel I/Q Mag

Pressing this key, when it is not selected, selects the Auxiliary Channel I/Q magnitude signal as the trigger. The Auxiliary Channel I/Q Magnitude trigger condition is met when the auxiliary receiver's I/Q magnitude output crosses the Auxiliary I/Q magnitude trigger level.

Key Path	Trigger, Baseband I/Q
Example	TRIG:<meas>:SOUR AIQM
Instrument S/W Revision	A.01.60 or later

Trigger Level Sets a level for the I/Q magnitude trigger. When the signal crosses this level, with the chosen slope, the trigger occurs.

Key Path	Trigger, Baseband I/Q, Aux Channel I/Q Mag
Remote Command	:TRIGger [:SEquence] :AIQMag:LEVel <ampl > :TRIGger [:SEquence] :AIQMag:LEVel?
Preset	-25 dBm
State Saved	Saved in instrument state.
Range	-200 dBm to 100 dBm
Remote Command Notes	The I/Q reference impedance is used for converting between power and voltage.
Example	TRIG:AIQM:LEV -30 dBm
Instrument S/W Revision	A.01.60 or later

Trig Slope Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, Baseband I/Q, Aux Channel I/Q Mag
Remote Command	:TRIGger[:SEquence]:AIQMag:SLOPe POSitive NEGative :TRIGger[:SEquence]:AIQMag:SLOPe?
Preset	POSitive
State Saved	Saved in instrument state.
Example	TRIG:AIQM:SLOP POS
Instrument S/W Revision	A.01.60 or later

Trig Delay Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT.

Key Path	Trigger, Baseband I/Q, Aux Channel I/Q Mag
Remote Command	:TRIGger[:SEquence]:AIQMag:DELay <time> :TRIGger[:SEquence]:AIQMag:DELay? :TRIGger[:SEquence]:AIQMag:DELay:STATe OFF ON 0 1 :TRIGger[:SEquence]:AIQMag:DELay:STATe?
Preset	1 us OFF
State Saved	Saved in instrument state.
Range	-2.5 s to +10 s
Example	TRIG:AIQM:DEL 10 ms TRIG:AIQM:DEL:STAT ON
Instrument S/W Revision	A.01.60 or later

Trigger Center Frequency This key sets the center frequency to be used by the auxiliary receiver.

Key Path	Trigger, Baseband I/Q, Aux Channel I/Q Mag
Remote Command	:TRIGger[:SEquence]:AIQMag:CENTer <freq> :TRIGger[:SEquence]:AIQMag:CENTer?
Preset	0 Hz
State Saved	Saved in instrument state.
Range	-40 MHz to 40 MHz

Trigger

Restriction and Notes	Trigger CF + 1/2 Trigger BW < Max Trigger CF – 1/2 Trigger BW > Min
Example	:TRIG:AIQM:CENT 10 MHz
Instrument S/W Revision	A.01.60 or later

Trigger Bandwidth This key sets the information bandwidth used by the auxiliary receiver for the Auxiliary Channel I/Q Magnitude trigger.

Key Path	Trigger, Baseband I/Q, Aux Channel I/Q Mag
Remote Command	:TRIGger [:SEquence] :AIQMag: BANDwidth <freq> :TRIGger [:SEquence] :AIQMag: BANDwidth?
Preset	Bandwidth option dependent: No Opt: 10 MHz Opt B25: 25 MHz Opt S40: 40 MHz
State Saved	Saved in instrument state.
Range	10 Hz to Maximum
Restriction and Notes	The combined sample rate for the main and auxiliary receivers cannot exceed 100 MSa/sec. The bandwidth available to the Trigger BW is limited to what is available after the main receiver's bandwidth (Info BW, sometimes pre-FFT BW) is set. Because of this limitation, the Max is not always achievable. The combination of Trigger Center Freq and Trigger BW is also limited: Trigger CF + 1/2 Trigger BW < Max Trigger CF – 1/2 Trigger BW > Min
Example	:TRIG:AIQM:BAND 8 MHz
Instrument S/W Revision	A.01.60 or later

Auto Trig

Sets the time that the analyzer will wait for the trigger conditions to be met. If they are not met after that much time, then the analyzer is triggered anyway.

Remote Command:	:TRIGger [:SEquence] :ATRigger <time> :TRIGger [:SEquence] :ATRigger? :TRIGger [:SEquence] :ATRigger: STATE OFF ON 0 1 :TRIGger [:SEquence] :ATRigger: STATE?
Example:	TRIG:ATR:STAT ON TRIG:ATR 100 ms

Preset:	Off, 100 ms
State Saved:	Saved in instrument state.
Min:	1 ms
Max:	100 s
Key Path:	Trig
Default Unit:	s
Instrument S/W Revision:	A.01.60 or later

Trig Holdoff

Sets the holdoff time between triggers. When the trigger condition is satisfied, the trigger occurs, the delay begins, and the holdoff time begins. New trigger conditions will be ignored until the holdoff time expires. For a free-running trigger, the holdoff value is the minimum time between triggers.

Remote Command:

```
:TRIGger[:SEquence]:HOLDoff <time>
:TRIGger[:SEquence]:HOLDoff?
:TRIGger[:SEquence]:HOLDoff:STATe OFF|ON|0|1
:TRIGger[:SEquence]:HOLDoff:STATe?
```

Example:

```
TRIG:HOLD:STAT ON
TRIG:HOLD 100 ms
Supplemental Information
```

Preset:	Off, 100 ms
State Saved:	Saved in instrument state.
Min:	0 s
Max:	0.5 s
Key Path:	Trig
Default Unit:	s
Instrument S/W Revision:	A.01.60 or later

Trigger

View/Display

The View/Display key opens up the View menu for the current measurement. This menu includes the **Display** key for controlling items on the display. The Display functions are common across multiple Modes and Measurements and are described in this section. See each measurement description for information on data views that are unique to that Measurement.

Views are different ways of looking at data, usually different ways of looking at the same data, especially when the data represents a time record that is being digitally processed with an FFT and/or other digital signal processing algorithms. In some modes, like the Spectrum Analyzer mode, we are mostly concerned with swept spectrum analysis, and those views may represent different ways of looking at the same signal.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Display

This is a menu common to all measurements for configuring items on the display. Keys not relevant to a given measurement should be grayed out. Keys not relevant to any measurement in a mode should be blanked. The Display menu settings are specific to the measurement selected under the **Meas** key, except for those settings under the **System Display Settings** key.

Key Path	View/Display
Instrument S/W Revision	A.01.60 or later

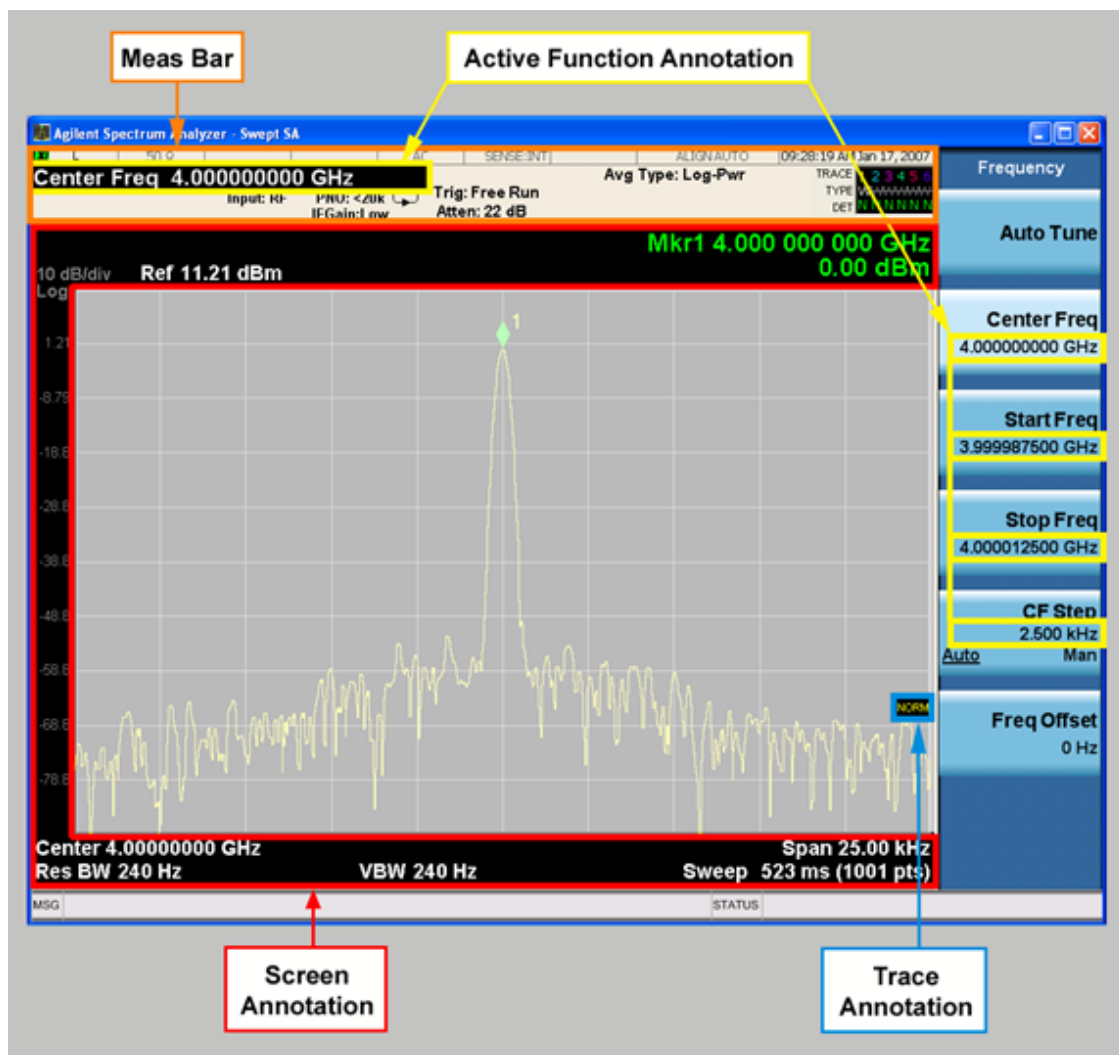
Annotation

Turns on/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 keys.

View/Display

See the figure below. Each type of annotation can be turned on and off individually.



Key Path **View/Display, Display**

Instrument S/W Revision **A.01.60 or later**

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.

Remote Command: `:DISPlay:ANNotation:MBAR[:STATe] OFF|ON|0|1`
`:DISPlay:ANNotation:MBAR[:STATe]?`

Example: `DISP:ANN:MBAR OFF`

Dependencies/Couplings: 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 Display Settings, Annotation is set to Off.
State Saved:	Saved in instrument state.
Key Path:	View/Display, Display, Annotation
Instrument S/W Revision:	A.01.60 or later

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.

Remote Command:	:DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]?
Example:	DISP:ANN:SCR OFF
Dependencies/Couplings:	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 Display Settings, Annotation is set to Off
State Saved:	Saved in instrument state.
Key Path:	View/Display, Display, Annotation
Instrument S/W Revision:	A.01.60 or later

Trace Turns on and off the labels on the traces, showing their detector (or their math mode) as described in the Trace/Detector section.

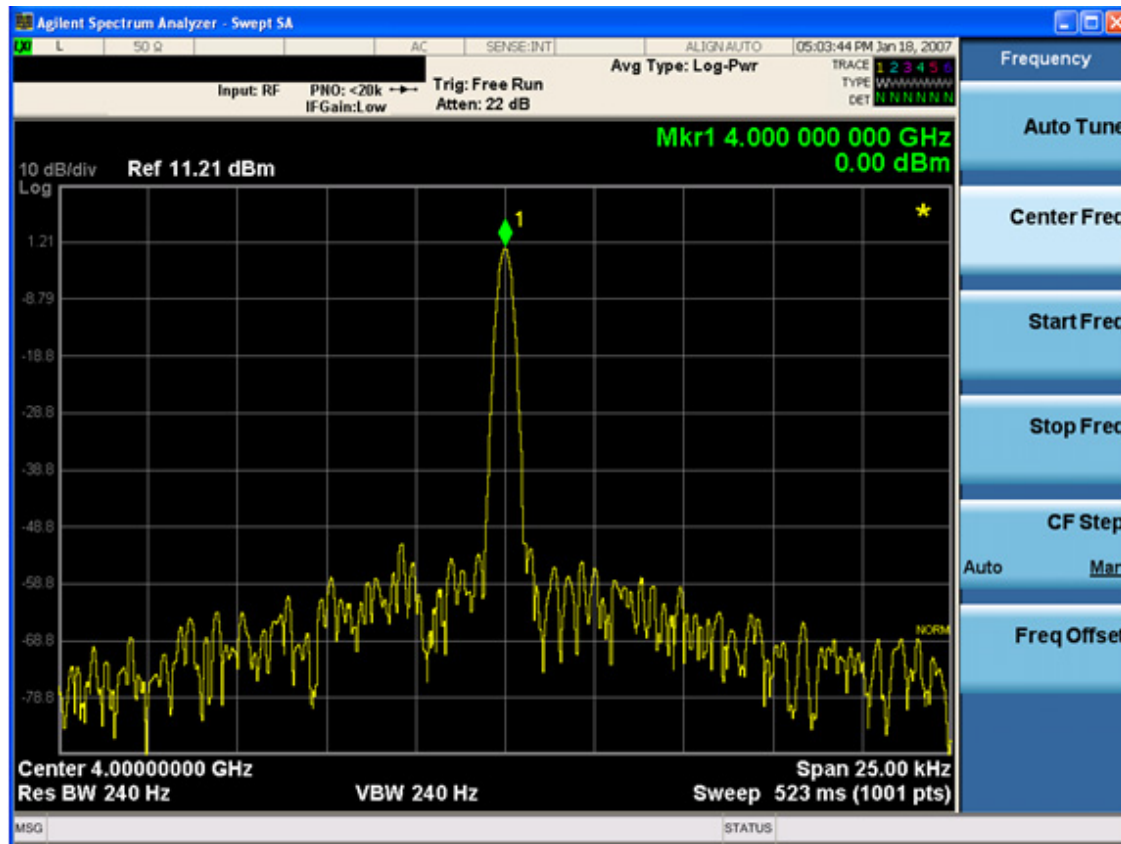
If trace math is being performed with a trace, then the trace math annotation will replace the detector annotation.

Remote Command:	:DISPlay:ANNotation:TRACe[:STATe] ON OFF 1 0 :DISPlay:ANNotation:TRACe[:STATe]?
Example:	DISP:ANN:TRAC OFF
Preset:	Off
State Saved:	Saved in instrument state.
Key Path:	View/Display, Display, Annotation
Instrument S/W Revision:	A.01.60 or later

View/Display

Active Function Values On/Off Turns on/off the active function display in the Meas Bar, and all of the active function values displayed on the keys.

Note that all of the keys that have active functions have these numeric values blanked when this function is on. This is a security feature.



Remote Command: :DISPlay:ACTivefunc[:STATE] ON|OFF|1|0
:DISPlay:ACTivefunc[:STATE]?

Example: DISP:ACT OFF

Dependencies/Couplings: 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 Display Settings, Annotation** is set to Off

State Saved: Saved in instrument state.

Key Path: **View/Display, Display, Annotation**

Instrument S/W Revision: A.01.60 or later

Title

Displays menu keys that enable you to change or clear a title on your display.

Key Path **View/Display, Display**

Instrument S/W Revision A.01.60 or later

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**.

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; for backwards compatibility, no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

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

Instrument S/W Revision A.01.60 or later

Key Path **View/Display, Display, Title**

Mode All

Preset No title (measurement name instead)

State Saved Saved in instrument state.

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.

Example: DISP:ANN:TITL:DATA "" clears any existing title characters.

View/Display

Remote Command Notes:	Use the :DISPlay:ANNotation:TITLe:DATA <string> command with an empty string.
Preset:	Performed on Preset.
Key Path:	View/Display, Display, Title
Instrument S/W Revision:	A.01.60 or later

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

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
Preset:	On
State Saved:	saved in instrument state
Key Path:	View/Display, Display
Instrument S/W Revision:	A.01.60 or later

Display Line

Activates an adjustable horizontal line that is used as a visual reference line. The line's vertical position corresponds to its amplitude value. The value of the display line (for example, "-20.3 dBm") appears above the line itself on the right side of the display in the appropriate font.

The display line can be adjusted using the step keys, knob, or numeric keypad. The unit of the Display Line is determined by the **Y axis unit** setting under **Amplitude**. If more than one window has a display line, the display line of the selected window is controlled.

If the display line is off the screen, it shows as a line at the top/bottom of the screen with an arrow pointing up or down. As with all such lines (Pk Thresh, Trigger Level, etc.) it is drawn on top of all traces.

The display line is unaffected by Auto Couple.

Remote Command:	:DISPlay:WINDow[1]:TRACe:Y:DLINe <amp;l> :DISPlay:WINDow[1]:TRACe:Y:DLINe? :DISPlay:WINDow[1]:TRACe:Y:DLINe:STATe OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:Y:DLINe:STATe?
Example:	DISP:WIND:TRAC:Y:DLIN:STAT ON DISP:WIND:TRAC:Y:DLIN:STAT -32 dBm

Preset:	Set the Display Line to Off and -25 dBm on Preset. When the Display Line goes from Off to On, if it is off screen, set it to either the top or bottom of screen, depending on which direction off screen it was. The Display Line's value does not change when it is turned off.
State Saved:	Saved in instrument state.
Min:	– (minus infinity) in current units
Max:	+ (plus infinity) in current units
Key Path:	View/Display, Display
Default Unit:	Depends on the current selected Y axis unit
Instrument S/W Revision:	A.01.60 or later

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, System Display Settings
Instrument S/W Revision	A.01.60 or later

Annotation Local Settings/All Off This is a Mode Global override of the meas local annotation settings. When it is **All Off**, it forces **Screen Annotation, 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, Screen, Meas Bar, Trace, and Active Function Values** keys under the **Display, Annotation** menu are grayed out and forced to **Off**. When **Local Settings** has been selected, you are able to set the local annotation settings on a measurement by measurement basis.

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.
Key Path:	View/Display, Display, System Display Settings, Annotation
Instrument S/W Revision:	A.01.60 or later

Theme This key allows you to change the Display theme. This is similar to the Themes

selection under Page Setup and Save Screen Image. The four themes are detailed below.

Remote Command:	:DISPlay:THEME TDColor TDMonochrome FCOLor FMONochrome :DISPlay:THEME?
Preset:	TDColor (Set by Restore Misc Defaults)
State Saved:	Not saved in instrument state.
Key Path:	View/Display, Display, System Display Settings
Remote Command Notes:	TDColor – 3D is the standard color theme with filling and shading TDMonochrome – is similar to 3D color, but only black is used FCOLor – flat color is intended for inkjet printers to conserve ink. It uses a white background instead of black. FMONochrome – is like flat color, but only black is used
Example:	DISP:THEM TDM sets the display theme to 3D Monochrome.
Instrument S/W Revision:	A.01.60 or later

Backlight Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

Remote Command:	:DISPlay:BACKlight ON OFF :DISPlay:BACKlight?
Preset:	ON (Set by Restore Misc Defaults)
Key Path:	View/Display, Display, System Display Settings
Instrument S/W Revision:	A.01.60 or later

On Turns the display backlight on.

Example:	DISP:BACK ON
Key Path:	View/Display, Display, System Display Settings, Backlight
Instrument S/W Revision:	A.01.60 or later

Off Turns the display backlight off.

Example:	DISP:BACK OFF
Key Path:	View/Display, Display, System Display Settings, Backlight

Instrument S/W Revision: A.01.60 or later

Backlight Intensity An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

Remote Command: :DISPlay:BACKlight:INTensity <integer>
:DISPlay:BACKlight:INTensity?

Example: DISP:BACK:INT 50

Preset: 100 (Set by Restore Misc Defaults)

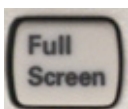
Min: 0

Max: 100

Key Path: **View/Display, Display, System Display Settings**

Instrument S/W Revision: A.01.60 or later

Full Screen



When **Full Screen** is pressed the measurement window expands horizontally over the entire instrument display. The screen graticule area expands to fill the available display area.

It turns off the display of the key labels, however the menus and active functions still work. (Though it would obviously be very hard to navigate without the key labels displayed.) Pressing **Full Screen** again while Full Screen is in effect cancels Full Screen.

Note that the banner and status lines are unaffected. You can get even more screen area for your data display by turning off the Meas Bar (in the Display menu) which also turns off the settings panel.

Full Screen is a Meas Global function. Therefore it is cancelled by the **Preset** key.

Remote Command: :DISPlay:FSCreen[:STATe] OFF|ON|0|1
:DISPlay:FSCreen[:STATe]?

Preset: Off

State Saved: Not saved in state.

Key Path: **Display**

Instrument S/W Revision: A.01.60 or later

Display Enable (Remote Command Only)

Turns the display on/off, including the display drive circuitry. The backlight stays lit so you can tell that the instrument is on. The display enable setting is mode global. The reasons for turning the display off are three:

- To increase speed as much as possible by freeing the instrument from having to update the display
- To reduce emissions from the display, drive circuitry
- For security purposes

If you have turned off the display:

- and you are in local operation, the display can be turned back on by pressing any key or by sending the SYSTem:DEFaults MISC command or the DISPlay:ENABle ON (neither *RST nor SYSTem:PRESet enable the display.)
- and you are in remote operation, the display can be turned back on by pressing the **Local** or **Esc** keys or by sending the SYSTem:DEFaults MISC command or the DISPlay:ENABle ON (neither *RST nor SYSTem:PRESet enable the display.)

and you are using either the SYSTem:KLOCK command or GPIB local lockout, then no front-panel key press will turn the display back on. You must turn it back on remotely.

Remote Command: :DISPlay:ENABle OFF|ON|0|1
 :DISPlay:ENABle?

Example: DISP:ENAB OFF

Dependencies/Couplings: DISP:ENAB OFF turns Backlight OFF and DISP:ENAB ON turns Backlight ON. However, settings of Backlight do not change the state of DISP:ENAB

Preset: On

 Set by SYST:DEF MISC, but Not affected by *RST or SYSTem:PRESet.

State Saved: Not saved in instrument state.

Instrument S/W Revision: A.01.60 or later

Common Measurement Functions

The key and command descriptions in this section describe functions that operate the same in multiple measurements and/or modes. This section is a library of functions that is referenced by many measurements and modes

To find the exact description and parameters for functions in a specific measurement, always look in the measurement section of this documentation. Pressing the front-panel key or softkey and then pressing the green Help key also provides the correct information.

NOTE

If you want to print the documentation, be sure to select this section and the measurement of interest to ensure having all the information you need. See [“Printing Acrobat Files” on page 93](#) for further instructions about printing.

AUTO COUPLE

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement which have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key is meas local key, so its actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

Remote Command: :COUPle ALL|NONE

Example: :COUP ALL

Remote Command Notes: :COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the **Auto Couple** key).

 :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements.

Instrument S/W Revision: A.01.60 or later

AUTO COUPLE

Cont (Continuous Measurement/Sweep)

Cont 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.

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
Key Path:	Front-panel key
Instrument S/W Revision:	A.01.60 or later

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 Number** (in **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 Number** 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 Number 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 **Continuous** 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's 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

Cont (Continuous Measurement/Sweep)

the idle state.

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.

Other functions related to the input/output connections can be found under **Trig** (trigger input controls) and **System** (LAN and other I/O bus configurations) and **Amplitude** (optional internal preamp).

The functions in the Input/Output menu are common to all Modes (applications). They are “global”. But individual functions are only available in a mode if they make sense. They will be grayed out (as opposed to not showing them at all). This is a special behavior of the Input/Output Menu, which is the only menu that is common across all applications.

Remote Command: [:SENSe] :FEED
 RF | AIQ | IQ | IONLy | QONLy | INDEpendent | AREFERENCE
 [:SENSe] :FEED?

Remote Command Notes: The parameter EXTMixer is for future use and is not supported at this time; sending it generates an error.

Preset: This setting is unaffected by a Preset or power cycle. It survives 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 state

Instrument S/W Revision: A.01.60 or later

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 Preset and 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.

Example: `[[:SENSE]:FEED RF`

Key Path: **Input/Output**

Instrument S/W Revision: A.01.60 or later

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, dB μ V, dB μ A, 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 ohm. Setting the computational input impedance to 75 ohm is useful when using a 75 ohm to 50 ohm adapter to measure a 75 ohm device on an analyzer with 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.

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 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 State

Key Path: **Input/Output, RF**

Instrument S/W Revision: A.01.60 or later

RF Coupling

Specifies alternating current (AC) or direct current (DC) coupling at the analyzer RF input port. Selecting AC coupling switches in a blocking capacitor that blocks any DC voltage present at the analyzer input. This decreases the input frequency range of the analyzer,

but prevents damage to the input circuitry of the analyzer if there is a DC voltage present at the RF input.

In AC coupling mode, you can view signals less than 10 MHz but the amplitude accuracy is not specified. To accurately see a signal of less than 10 MHz, you must switch to DC coupling.

Some amplitude specifications apply only when coupling is set to DC. Refer to the appropriate amplitude specifications and characteristics for your analyzer.

When operating in DC coupled mode, ensure protection of the analyzer input circuitry by limiting the DC part of the input level to within 200 mV of 0 Vdc. In AC or DC coupling, limit the input RF power to +30 dBm (1 Watt).

Selecting Input Coupling

X-Series Option	AC Frequency Range	N9010A DC Frequency Range	N9020A DC Frequency Range
Option 503	10 MHz to 3.6 GHz	9 kHz to 3.6 GHz	3 Hz to 3.6 GHz
Option 507	10 MHz to 7.0 GHz	9 kHz to 7.0 GHz	
Option 508	10 MHz to 8.4 GHz		3 Hz to 8.4 GHz
Option 513	10 MHz to 13.6 GHz	9 kHz to 13.6 GHz	3 Hz to 13.6 GHz
Option 526	10 MHz to 26.5 GHz	9 kHz to 26.5 GHz	3 Hz to 26.5 GHz

Remote Command: :INPut:COUPling AC|DC
 :INPut:COUPling?

Example: INP:COUP DC

Preset: AC

State Saved: Saved in State

Key Path: **Input/Output, RF**

Instrument S/W Revision: A.01.60 or later

I/Q

This feature is not available unless the Baseband I/Q option (BBA) is installed.

Selects the front panel I/Q input ports to be the analyzer signal input. If I/Q is already

Input/Output

selected, pressing this key accesses the I/Q setup menu.

Restriction and Notes	Not all measurements support the use of the I/Q signal input. When I/Q is selected in a measurement that does not support it, the “Meas invalid with I/Q inputs” error condition occurs.
Remote Command Notes	<p>The parameters IQ IONLY QONLY are only supported for backwards compatibility. The E44406 SCPI has the following that corresponds to FEED:IQ:TYPE for MXA.</p> <pre>[[:SENSE]:FEED IQ IONLY QONLY</pre> <pre>[[:SENSE]:FEED?</pre> <p>[[:SENSE]:FEED IQ will set the I/Q path to IQ</p> <pre>[[:SENSE]:FEED IQONLY will set the I/Q path to I Only</pre> <pre>[[:SENSE]:FEED IQONLY will set the I/Q path to Q Only</pre> <p>Note [[:SENSE]:FEED? will not be backward compatible. The query [[:SENSE]:FEED? will always returns AIQ whatever the type of legacy parameters IQ IONLY QONLY has been used.</p>
Example	FEED AIQ
Instrument S/W Revision	A.01.60 or later
Key Path	Input/Output
Mode	BASIC, CDMA2K, EDGE GSM, TDSCMDA, VSA89601, WIMAX OFDMA

The Baseband I/Q functionality is a hardware option. It is option BBA. If the option is not installed, none of the I/Q functionality is enabled.

The Baseband I/Q has four input ports and one output port. The input ports are I, I-bar, Q, and Q-bar. The I and I-bar together compose the I channel and the Q and Q-bar together compose the Q channel. Each channel has two modes of operation, Single-Ended (also called “unbalanced”) and Differential Input (also called “balanced”). When in Single-Ended operation, only the main port (I or Q) is used and the complementary port (I-bar or Q-bar) is ignored. When in Differential Input mode, both main and complementary ports are used.

The input settings (range, attenuation, skew, impedance, external gain) apply to the channels, not the individual ports.

The system supports a variety of 1 M Ω input passive probes as well as the Agilent 113x Series active differential probes using the Infinimax probe interface.

The Agilent 113x Series active probes can be used for both single ended and differential measurements. In either case a single connection is made for each channel (on either the I or Q input). The input is automatically configured to 50 Ω single ended and the probe power is supplied through the Infinimax interface. The probe can be configured for a variety of input coupling and low frequency rejection modes. In addition, a wide range of

offset voltages and probe attenuation accessories are supported at the probe interface. The active probe has the advantage that it does not significantly load the circuit under test, even with unity gain probing.

With passive 1 M Ω probes, the probe will introduce a capacitive load on the circuit, unless higher attenuation is used at the probe interface. Higher attenuation reduces the signal level and degrades the signal-to-noise-ratio of the measurement. Passive probes are available with a variety of attenuation values for a moderate cost. Most Agilent passive probes can be automatically identified by the system, setting the input impedance setting required as well as the nominal attenuation. For single ended measurements a single probe is used for each channel. Other passive probes can be used, with the attenuation and impedance settings configured manually.

For full differential measurements, the system supports probes on each of the four inputs. The attenuation of the probes should be the same for good common mode rejection and channel match.

Both active and passive probes in single ended and differential configurations can be calibrated. This calibration uses the Cal Out BNC connection and a probe connection accessory. The calibration achieves excellent absolute gain flatness in a probed measurement. It matches both the gain and frequency response of the I and Q channels as well as any delay skew, resulting in high accuracy in derived measurements such as Error Vector Magnitude (EVM).

When a probe is connected a status message will be displayed. The message will indicate if calibration data is available or not. Calibration data is saved for each type of probe (including “none”) for each port and will be reapplied whenever that type of probe is re-connected to the same port. For probes with EEPROM identification, the calibration data will be stored based on the unique probe identifier and will reapply data for that particular probe if it is available. The data will not follow a probe from one port to another. For probes without EEPROM identification, the instrument cannot distinguish between different probes of the same type and it will use the data from the last calibration for that probe type on that port.

When in differential mode, both the main and complementary probes are expected to be of the same type.

In some situations, the I and Q channels should be configured identically. In other situations it is convenient to control them independently. Some menus have a “Q Same as I” setting that will cause the Q channel configuration to mirror the I channel configuration, avoiding the overhead of double data entry when the channels should be the same.

The output port is for calibrating the I/Q input ports, although it can also be manually controlled.

There are two types of calibrations available: cable calibration and probe calibration. The cable calibration will guide you through connecting each input port in turn. All ports must be calibrated together. The probe calibration is done for a specific channel (I or Q). If in Single-Ended mode, only the main port is calibrated. When in Differential Input mode, you are guided through calibrating both main and complementary ports.

The front panel I/Q port LEDs indicate the current state of that port. On (green) indicates it is active, and off (dark) indicates it is not in use. For example, the Cal Out port LED is on

if and only if there is signal coming out of that port.

The input is a context and some parameters have separate values for each context. The SCPI for these parameters has an optional “[:RF | IQ]” node. If the specific context is omitted, the command acts on the current input context's value. Here are the parameters that are input context sensitive:

- Center Frequency
- Trigger Source

It is important to distinguish between the I and Q input ports and the displayed I and Q data values. The I and Q input ports feed into a digital receiver that does digital tuning and filtering. The I and Q data seen by you (either on the display or through SCPI) corresponds to the real (“I”) and the imaginary (“Q”) output from the digital receiver. When the input path is I+jQ or I Only and the center frequency is 0 Hz the I input ends up in as the real output from the receiver and appears as “I” data. Likewise, when the input path is I+jQ and the center frequency is 0 Hz, the Q input ends up as the imaginary output from the receiver and appears as “Q” data. However, when the input path is Q Only, the Q input is sent to the receiver as Q+j0, so the receiver output has the Q input coming out on the real output, and so in Q Only, the signal from the Q input port appears as the “I” data. Another situation where the I and Q data do not necessarily correspond directly to the I and Q inputs is when the center frequency is non-zero. The digital processing involved in the tuning is a complex operation. This will result in I Only data appearing as both “I” and “Q” data, the same as that signal would appear if seen through the RF input port.

I/Q Path

Select which I/Q input channels are active. The LED next to each I/Q input port will be on when that port is active.

The analysis bandwidth for each channel is the same as that of the instrument. So, for example, the base N09020A has a bandwidth of 10 MHz. With I/Q input the I and Q channels would each have an analysis bandwidth of 10 MHz, giving 20 MHz of bandwidth when the I/Q Path is I+jQ. With option B25, the available bandwidth becomes 25 MHz, giving 25 MHz each to I and Q and 50 MHz to I+jQ.

I/Q voltage to power conversion processing is dependent on the I/Q Path selected.

- With I+jQ input we know that the input signal may not be symmetrical about 0 Hz, because it has a complex component. Therefore, above 0 Hz only the positive frequency information is displayed, and below 0 Hz only the negative frequency information is displayed.
- With all other Input Path selections, the input signal has no complex component and therefore is always symmetrical about 0 Hz. In this case, by convention, the power conversion shows the combined voltage for both the positive and negative frequencies. The information displayed below 0 Hz is the mirror of the information displayed above 0 Hz. This results in a power reading 6.02 dB higher (for both) than would be seen with only the positive frequency voltage. Note also that, in this case the real signal may have complex modulation embedded in it, but that must be recovered by further signal processing.

•

Key Path	Input/Output, I/Q
Remote Command	[:SENSE] :FEED:IQ:TYPE IQ IONLy QONLy INdependent [:SENSe] :FEED:IQ:TYPE?
Preset	IQ
State Saved	Yes This is unaffected by Preset but is set to the default value on a “Restore Input/Output Defaults” or “Restore System Defaults->All”
Range	I+jQ I Only Q Only Independent I and Q
Restriction and Notes	The Independent I and Q selection is only available in GPVSA
Example	Set the input to be both the I and Q channels, combined as $I + j * Q$. FEED:IQ:TYPE IQ
Instrument S/W Revision	A.01.60 or later

Remote Command:	:INPut [1] :IQ:TYPE IQ I Q :INPut [1] :IQ:TYPE?
Preset:	IQ
Instrument S/W Revision:	A.01.60 or later

I+jQ Set the signal input to be both the I and Q channels. The I and Q channel data will be combined as $I + j * Q$.

Key Path	Input/Output, I/Q, I/Q Path
Example	Set the input to be both the I and Q channels, combined as $I + j * Q$. FEED:IQ:TYPE IQ
Instrument S/W Revision	A.01.60 or later

I Only Set the signal input to be only the I channel. The Q channel will be ignored. The data collected is still complex. When the center frequency is 0 the imaginary part will always be zero, but for any other center frequency both the real and imaginary parts will be significant.

Key Path	Input/Output, I/Q, I/Q Path
Example	Set the input to be only the I channel. FEED:IQ:TYPE IONL
Instrument S/W Revision	A.01.60 or later

Input/Output

Q Only Set the signal input to be only the Q channel. The I channel will be ignored. The Q channel will be sent to the digital receiver block as $Q+j0$. The receiver's output is still complex. When the center frequency is 0 the imaginary part will always be zero, but for any other center frequency both the real and imaginary parts will be significant. Note that since the receiver's real output is displayed as the "I" data, when the center frequency is 0, the Q Only input appears as the "I" data.

Key Path	Input/Output, I/Q, I/Q Path
Example	Set the input to be only the Q channel. FEED:IQ:TYPE QONL
Instrument S/W Revision	A.01.60 or later

Independent I and Q Set the signal input to be both the I and Q channels, but as independent inputs. It is equivalent to treating I as channel 1 and Q as channel 2 in an oscilloscope. Each channel's data is still complex. When the center frequency is 0 the imaginary part will always be zero, but for any other center frequency both the real and imaginary parts will be significant.

This selection is only available in VXA.

Key Path	Input/Output, I/Q, I/Q Path
Restriction and Notes	The Independent I and Q selection is only available in GPVSA
Example	Turn on both I and Q channels and treat I as channel 1 and Q as channel 2. FEED:IQ:TYPE IND
Instrument S/W Revision	A.01.60 or later

I Setup

Access the channel setup parameters for the I channel.

Key Path	Input/Output, I/Q
Instrument S/W Revision	A.01.60 or later

I Differential Input Select differential input on or off for the I channel. For differential input (also called balanced input), the analyzer uses both main and complementary ports. When differential input is off (also called single-ended or unbalanced input), the analyzer uses only the main port.

Key Path	Input/Output, I/Q, I Setup
Remote Command	:INPut:IQ[:I]:DIFFerential OFF ON 0 1 :INPut:IQ[:I]:DIFFerential?
Preset	Off

State Saved	Yes This is unaffected by Preset but is set to the default value on a “Restore Input/Output Defaults” or “Restore System Defaults->All”
Range	Off On
Dependencies/Couplings	Some active probes include built-in differential capability. When one of these probes is sensed, this key is disabled. Since the differential capability is handled in the probe, the Analyzer will use only the main port and the key will show that the Analyzer's Differential Input mode is Off (indicating that the complementary port not in use). When Q Same as I is On, the value set for I will also be copied to Q.
Restriction and Notes	When Differential Input = On, the analyzer will check for attenuation mismatches between the I and I-bar ports. If the difference in attenuation values exceeds 0.5 dB an error condition will be set.
Example	Put the I channel in Differential Input mode INP:IQ:DIFF ON
Instrument S/W Revision	A.01.60 or later
Remote Command:	:INPut [1] :IQ:BALanced[:STATe] OFF ON 0 1 :INPut [1] :IQ:BALanced[:STATe] ?
Preset:	OFF
Remote Command Notes:	This backwards compatibility SCPI command was for an instrument without independent settings for the I and Q channels. Therefore, it is tied only to the I channel and does not provide an equivalent for the Q channel. For proper operation of the backwards compatibility command Q Same as I should be set to On.
Instrument S/W Revision:	A.01.60 or later

I Input Z Select the input impedance for the I channel. The impedance applies to both the I and I-bar ports.

The input impedance controls the hardware signal path impedance match. It is not used for converting voltage to power. The voltage to power conversion always uses the Reference Z parameter. The Reference Z parameter applies to both I and Q channels.

Remote Command	:INPut [1] :IQ[:I] :IMPedance LOW HIGH :INPut [1] :IQ[:I] :IMPedance?
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Input/Output

Dependencies/Couplings	Input impedance is a built-in characteristic of a probe. Therefore, whenever a probe is sensed, this key is disabled and the value is set to match the probe. When no probe is sensed on Q and Q Same as I is On, the value set for I will also be copied to Q.
Remote Command Notes	LOW = 50 Ω HIGH = 1 M Ω
Example	Set the I channel input impedance to 1 M Ω INP:IQ:IMP HIGH
Instrument S/W Revision	A.01.60 or later
Key Path	Input/Output, I/Q, I Setup
Preset	LOW
State Saved	Yes This is unaffected by Preset but is set to the default value on a “Restore Input/Output Defaults” or “Restore System Defaults->All”
Range	50 Ω 1 M Ω

I Skew This command sets the skew factor for the I channel. The skew will shift the channel's data in time. Use this to compensate for differences in the electrical lengths of the input paths due to cabling.

Key Path	Input/Output, I/Q, I Setup
Remote Command	[:SENSe] :CORRection:IQ[:I] :SKEW <seconds> [:SENSe] :CORRection:IQ[:I] :SKEW?
Preset	0
State Saved	Yes This is unaffected by Preset but is set to the default value on a “Restore Input/Output Defaults” or “Restore System Defaults->All”
Range	0 s to 100 ns
Example	Delay the data for the I channel by 10 ns. CORR:IQ:SKEW 10 ns
Instrument S/W Revision	A.01.60 or later

I Probe Access the probe setup parameters for the I channel. See [“I/Q Probe Setup” on page 828](#).

Key Path	Input/Output, I/Q, I Setup
State Saved	No
Instrument S/W Revision	A.01.60 or later

Combined Differential/Input Z This is SCPI only (no front panel) and is for backwards compatibility only. It combines the Differential Input and Input Z selections into a single SCPI command.

Remote Command: :INPut:IMPedance:IQ U50|B50|U1M|B1M
:INPut:IMPedance:IQ?

Preset: U50

Remote Command Notes: The enum values translate as follows:

U50: Differential Input = Off, Input Z = 50 Ω

B50: Differential Input = On, Input Z = 50 Ω

U1M: Differential Input = Off, Input Z = 1 M Ω

B1M: Differential Input = On, Input Z = 1 M Ω

This command is for backwards compatibility. It combines the Input Z (50 Ω or 1 M Ω) parameter with the Differential Input (Off = “Unbalanced”, On = “Balanced”) parameter into a single enumeration.

This backwards compatibility SCPI command was for an instrument without independent settings for the I and Q channels. Therefore, it is tied only to the I channel and does not provide an equivalent for the Q channel. For proper operation of the backwards compatibility command Q Same as I should be set to On.

Also, note the subtle difference between this SCPI command and the backwards compatibility command for Input Z. The Input Z SCPI has “IQ” before “IMP” while this command has that order reversed.

Dependencies/Couplings: This command does not have an independent parameter, but instead is tied to the Differential Input and Input Z parameters. The coupling for those parameters apply to this command too.

Example: INPut:IMPedance:IQ U50

This is equivalent to the following two SCPI commands:

INP:IQ:DIFF OFF

INP:IQ:IMP 50

Instrument S/W Revision: A.01.60 or later

Q Setup

Access the channel setup parameters for the Q channel.

Key Path **Input/Output, I/Q**

Instrument S/W Revision A.01.60 or later

Q Same as I Many, but not all, usages require the I and Q channels have an identical setup.

Input/Output

To simplify channel setup, the Q Same as I will cause the Q channel parameters to be mirrored from the I channel. That way you only needs to set up one channel (the I channel). The I channel values are copied to the Q channel, so at the time Q Same as I is turned off the I and Q channel setups will be identical. This does not apply to Probe settings or to parameters that determined by the probe.

Key Path	Input/Output, I/Q, Q Setup
Remote Command	:INPut:IQ:MIRRored OFF ON 0 1 :INPut:IQ:MIRRored?
Preset	This is unaffected by Preset but is set to the default value (Q Same as I set to “On”) on a “Restore Input/Output Defaults” or “Restore System Defaults->All”
State Saved	Saved in instrument state.
Range	On Off
Dependencies/Couplings	Only displayed for the Q channel. When Yes, the I channel values for some parameters are mirrored (copied) to the Q channel. However, when a parameter is determined by the type of probe and a probe is sensed, the probe setting is always used and the I channel setting is ignored. The following parameters are mirrored: Differential Input (when not determined by probe) Input Z (when not determined by probe)
Example	Turn off the mirroring of parameters from I to Q. INP:IQ:MIRR OFF
Instrument S/W Revision	A.01.60 or later

Q Differential Input Select differential input on or off for the Q channel. For differential input (also called balanced input), the analyzer uses both the Q and Q-bar ports. When differential input is off (also called single-ended or unbalanced input), the analyzer uses only the Q port.

Key Path	Input/Output, I/Q, Q Setup
Remote Command	:INPut:IQ:Q:DIFFerential OFF ON 0 1 :INPut:IQ:Q:DIFFerential?
Preset	Off
State Saved	On This is unaffected by Preset but is set to the default value on a “Restore Input/Output Defaults” or “Restore System Defaults->All”
Range	Off On

Dependencies/Couplings	<p>Some active probes include built-in differential capability. When one of these probes is sensed, this key is disabled. Since the differential capability is handled in the probe, the Analyzer will use only the main port and the key will show that the Analyzer's Differential Input mode is Off (indicating that the complementary port not in use).</p> <p>When a differential probe is not sensed and Q Same as I is On, the value set for I will be copied to Q. This key is disabled when Q Same as I is On.</p>
Restriction and Notes	When Differential Input = On, the analyzer will check for attenuation mismatches between the Q and Q-bar ports. If the difference in attenuation values exceeds 0.5 dB an error condition will be set.
Example	<p>Put the Q channel in Differential Input mode</p> <p>INP:IQ:Q:DIFF ON</p>
Instrument S/W Revision	A.01.60 or later

Q Input Z Select the input impedance for the Q channel. The impedance applies to both the Q and Q-bar ports.

The input impedance controls the hardware signal path impedance match. It is not used for converting voltage to power. The voltage to power conversion always uses the Reference Z parameter. The Reference Z parameter applies to both I and Q channels.

Remote Command : INPut [1] : IQ:Q: IMPedance LOW|HIGH
: INPut [1] : IQ:Q: IMPedance?

Dependencies/Couplings	<p>Input impedance is a built-in characteristic of a probe. Therefore, whenever a probe is sensed, this key is disabled and the value is set to match the probe.</p> <p>When no probe is sensed and Q Same as I is On, the value set for I will also be copied to Q. This key is disabled when Q Same as I is On.</p>
Remote Command Notes	LOW = 50 Ω HIGH = 1 M Ω
Example	<p>Set the Q channel input impedance to 1 MΩ</p> <p>INP:IQ:Q:IMP HIGH</p>
Instrument S/W Revision	A.01.60 or later
Key Path	Input/Output, I/Q, Q Setup
Preset	LOW
State Saved	On

This is unaffected by Preset but is set to the default value on a “Restore Input/Output Defaults” or “Restore System Defaults->All”

Input/Output

Range 50 Ω | 1 M Ω

Q Skew This command sets the skew factor for the Q channel. The skew will shift the channel's data in time. Use this to compensate for differences in the electrical lengths of the input paths due to cabling and probes.

Key Path	Input/Output, I/Q, Q Setup
Remote Command	<code>[:SENSe] :CORRection:IQ:Q:SKEW <seconds></code> <code>[:SENSe] :CORRection:IQ:Q:SKEW?</code>
Preset	0
State Saved	Yes This is unaffected by Preset but is set to the default value on a “Restore Input/Output Defaults” or “Restore System Defaults->All”
Range	0 s to 100 ns
Example	Delay the data for the Q channel by 10 ns. <code>CORR:IQ:Q:SKEW 10 ns</code>
Instrument S/W Revision	A.01.60 or later

Q Probe Access the probe setup parameters for the Q channel. See **I/Q Probe Setup**, below

Key Path	Input/Output, I/Q, Q Setup
State Saved	No
Instrument S/W Revision	A.01.60 or later

I/Q Probe Setup

The set of I/Q probe setup parameters will change based on the type of probe that is sensed. All probe types have the Attenuation parameter, and all probe types can be calibrated. The remaining parameters are only available for some probe types and will not be shown when not available. The probe type is determined by and reported for only for the I and Q ports, never the I-bar or Q-bar ports. The menu title will be “<ch>: <probe id>”, where “<ch>” is either “I” or “Q” and “<probe id>” is the type of probe. For example, for the I Probe setup with an Agilent 1130A probe connected to the I port, the title will be “I: 1130A”.

Probe calibration data is stored for each probe type for each channel. When no probe is sensed, the probe type “Unknown” is used, and this is also treated like a probe type with its own calibration data. When a probe is changed, the calibration data for that probe type for that port is restored. An advisory message will be displayed showing the new probe type and the calibration status. The calibration data is stored permanently (survives power cycle) and is not affected by Preset or any of the Restore commands. When the probe has EEPROM identification (most newer Agilent probes have this), the calibration data is stored by probe serial number and port, so if you have two probes of the same type, the

correct calibration data will be used for each. For probes that do not have EEPROM identification, the calibration data is stored by probe type and port and the instrument cannot distinguish between different probes of the same type. In all cases (with or without EEPROM identification), the calibration data is port specific, so it will not follow a specific probe from port to port if the probe is moved.

The “Unknown” probe type is used whenever no probe is sensed. When no calibration data exists for “Unknown” the latest cable calibration data is used (see [“I/Q Guided Calibration” on page 849](#)).

Attenuation The attenuation is part of the calibration data stored with the probe type and is initially the value that was returned by the last calibration. You is able to modify this value and any changes will be stored with the calibration data and will survive power cycles and presets. When a probe calibration is performed the attenuation value will be overwritten by the calibration.

Key Path	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe
Remote Command	<code>[:SENSE] :CORRection:IQ:I Q:ATTenuation:RATio <real></code> <code>[:SENSE] :CORRection:IQ:I Q:ATTenuation:RATio?</code>
Preset	Each probe type has its own default. The default for the “Unknown” probe type is 1:1.
State Saved	Saved with probe calibration data. It survives power cycle and is not affected by Preset or Restore.
Range	0.001 to 10000
Restriction and Notes	Each probe type has its own attenuation setting. As probes are changed the attenuation value will reflect the new probe's setting. Changing the attenuation affects only the current probe type's setting and leaves all others unchanged.
Example	Set the attenuation for the current I probe to 100.00:1. <code>CORR:IQ:I:ATT:RAT 100</code>
Instrument S/W Revision	A.01.60 or later

This is an alternate form of the SCPI that allows input as a power instead of a ratio.

Remote Command:	<code>[:SENSE] :CORRection:IQ:I Q:ATTenuation <rel_ampl></code> <code>[:SENSE] :CORRection:IQ:I Q:ATTenuation?</code>
Range:	-60 dB to +80 dB
Example:	Set the attenuation for the current I probe type to 100.00:1. <code>CORR:IQ:I:ATT 20 dB</code>
Instrument S/W Revision:	A.01.60 or later

Offset Some active probes have DC offset capability. When one of these probes is connected

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this control will be visible. The signal is will be adjusted for the DC offset before entering the analyzer's port. This allows for removal of a DC offset before hitting the analyzer's input port voltage limits. For example, a signal that varies 1 V peak-to-peak with a DC offset equal to the analyzer's max input voltage would exceed the input limits of the analyzer for half its cycle. Removing the DC offset allows the analyzer to correctly process the entire signal.

Key Path	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe
Remote Command	:INPut:OFFSet:I Q <voltage> :INPut:OFFSet:I Q?
Preset	0 V
State Saved	Saved with probe calibration data. It survives power cycle and is not affected by Preset or Restore.
Range	-18 V to +18 V
Restriction and Notes	Only some probe types support Offset. For those that do, each probe type has its own Offset setting. As probes are changed the Offset value will reflect the new probe's setting. Changing the Offset affects only the current probe type's setting and leaves all others unchanged.
Example	Remove a DC offset of -0.5 V from the I channel input. INP:OFF:I -0.5
Instrument S/W Revision	A.01.60 or later

Coupling Some probe types allow coupling to reject low frequencies. This will filter out the DC component of a signal that is composed of a DC bias plus some AC signal. This control is visible only for probe types that have this capability.

Key Path	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe
Remote Command	:INPut:COUPling:I Q DC LFR1 LFR2 :INPut:COUPling:I Q?
Preset	DC
State Saved	Saved with probe calibration data. It survives power cycle and is not affected by Preset or Restore.
Range	DC AC 1.7 Hz LFR1 AC 0.14 Hz LFR2
Restriction and Notes	Only some probe types support Coupling. For those that do, each probe type has its own Coupling setting. As probes are changed the Coupling value will reflect the new probe's setting. Changing the Coupling affects only the current probe type's setting and leaves all others unchanged.

Example Set the probe to low frequency rejection below 1.7 Hz.
INP:COUP:I LFR1

Instrument S/W Revision A.01.60 or later

DC Turn off low frequency rejection, allowing signals down to DC.

Key Path **Input/Output, I/Q, I Setup | Q Setup, I Probe | Q Probe, Coupling**

Example Turn off low frequency rejection on the I channel
INP:COUP:I DC

Instrument S/W Revision A.01.60 or later

LFR1 Turn on low frequency rejection, rejecting signal component lower than 1.7 Hz.

Key Path **Input/Output, I/Q, I Setup | Q Setup, I Probe | Q Probe, Coupling**

Example Turn on low frequency rejection on the I channel for frequencies lower than 1.7 Hz
INP:COUP:I LFR1

Instrument S/W Revision A.01.60 or later

LFR2 Turn on low frequency rejection, rejecting signal component lower than 0.14 Hz.

Key Path **Input/Output, I/Q, I Setup | Q Setup, I Probe | Q Probe, Coupling**

Example Turn on low frequency rejection on the I channel for frequencies lower than 0.14 Hz
INP:COUP:I LFR2

Instrument S/W Revision A.01.60 or later

Calibrate Invoke the guided probe calibration. The guided probe calibration is context sensitive and depends on the channel (I or Q) and the Differential Input state. The calibration is only performed on the selected channel. When Differential Input is on, both the probe attached to the main port and the probe attached to the complementary port are calibrated. When Differential Input is off, only the probe attached to the main port is calibrated. See [“I/Q Guided Calibration” on page 849](#).

Key Path **Input/Output, I/Q, I Setup | Q Setup, I Probe | Q Probe, Coupling**

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Clear Calibration Clear the calibration data for the current port and probe. It does not clear the data for other probe types or other ports. If the sensed probe has EEPROM identification, only the data for that specific probe is cleared. After this command has completed, the probe calibration state will be the same as if no probe calibration had ever

Input/Output

been performed for the specified channel and probe; the probe attenuation will be the default value for that probe type and the Cable Calibration frequency response corrections will be used. This command is dependent on the Differential Input state. When Differential Input is on, both the data for the probe attached to the main port and the data for the probe attached to the complementary port are cleared. When Differential Input is off, only data for the probe attached to the main port is cleared.

Key Path	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling
Remote Command	:CALibration:IQ:PROBe:I Q:CLEar
Example	Clear the calibration data for the I channel and the current probe (with EEPROM identification) or probe type (without EEPROM identification). :CAL:IQ:PROBe:I:CLE
Instrument S/W Revision	A.01.60 or later

Reference Z

Set the value of the impedance to be used in converting voltage to power for the I and Q channels. This does not change the hardware's path impedance (see [“I Input Z” on page 823](#)).

Key Path	Input/Output, I/Q
Remote Command	:INPut:IMPedance:REFerence <integer> :INPut:IMPedance:REFerence?
Preset	50 Ω
State Saved	Yes This is unaffected by Preset but is set to the default value on a “Restore Input/Output Defaults” or “Restore System Defaults->All”
Range	1 Ω to 1 M Ω
Example	Set the I/Q reference impedance to 50 Ω INP:IMP:REF 50
Instrument S/W Revision	A.01.60 or later

RF Calibrator

Lets you choose a calibrator signal to look at or turns the calibrator “off” (meaning switches back to the selected input). If one of the three calibrator signals (50 MHz, -25 dBm, the 4.8 GHz internal amplitude reference or the 300 MHz comb signal) is chosen (as opposed to OFF), the analyzer routes the selected internal amplitude reference as the input signal, while leaving the input selection in the menus (RF, Ext Mix or I/Q) unchanged.

The 50 MHz internal reference and the 300 MHz comb signal are available with all the frequency options. The 4.8 GHz internal reference is only available with 507, 508, 513, 526,

544, and 550.

This function presets to OFF on a Mode Preset, which causes the internal circuitry to switch back to the selected input (RF, Ext Mix or I/Q).

Remote Command:	[:SENSE] :FEED:AREFERENCE REF50 REF4800 COMB OFF [:SENSE] :FEED:AREFERENCE?
Example:	FEED:AREF REF50 selects the 50 MHz amplitude reference as the signal input. FEED:AREF REF4800 selects the 4.8 GHz amplitude reference as the signal input FEED:AREF COMB selects the 300 MHz comb modulated signal as the signal input FEED:AREF OFF turns the calibrator “off” (meaning switches back to the selected input – RF, ExtMix or I/Q)
Dependencies/Couplings:	Selecting an input (RF, Ext Mix or I/Q) turns the Calibrator OFF. This is true whether the input is selected by the keys or with the [:SENSE]:FEED command.
Preset:	OFF
State Saved:	Saved in State
Key Path:	Input/Output
Instrument S/W Revision:	A.01.60 or later

50 MHz

Key Path	Input/Output, RF Calibrator
Instrument S/W Revision	A.01.60 or later

4.8 GHz

Selects the 4.8 GHz internal reference as the input signal.

Key Path	Input/Output, Amptd Ref
Instrument S/W Revision	A.01.60 or later

Comb

Key Path	Input/Output, RF Calibrator
Instrument S/W Revision	A.01.60 or later

Input/Output

Off

Switches the input back to the selected input (RF, Ext Mix or I/Q)

Key Path	Input/Output, RF Calibrator
Instrument S/W Revision	A.01.60 or later

External Gain

Compensates for gain/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/loss.

Entering an External Gain value does not affect the Reference Level, therefore the trace position on screen changes, as do all of 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 which is not updating, will immediately change all of the above, without new data needing to be taken.

Changing the External Gain causes the analyzer to immediately stop the current sweep and prepare to begin a new sweep, but 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/loss. In a measurement application mode like GSM or W-CDMA, the gain/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.

Dependencies/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.
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Key Path:	Input/Output
Instrument S/W Revision:	A.01.60 or later

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.)

Please 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/loss.

Remote Command:	<code>[:SENSe]:CORRection:SA[:RF]:GAIN <rel_ampl></code> <code>[:SENSe]:CORRection:SA[:RF]:GAIN?</code>
Example:	<code>CORR:SA:GAIN 10</code> sets the Ext Gain value to 10 dB <code>CORR:SA:GAIN -10</code> sets the Ext Gain value to -10 dB (that is, an attenuation of 10 dB)
Dependencies/Couplings:	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 many application Modes.
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 State
Min:	-81.90 dB
Max:	81.90 dB
Key Path:	Input/Output, Ext Gain
Instrument S/W Revision:	A.01.60 or later

MS

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

Remote Command:	<code>[:SENSe]:CORRection:MS[:RF]:GAIN <rel_ampl></code> <code>[:SENSe]:CORRection:MS[:RF]:GAIN?</code>
Example:	<code>CORR:MS:GAIN 10</code> sets the Ext Gain value to 10 dB <code>CORR:MS:GAIN -10</code> sets the Ext Gain value to -10 dB (that is, a loss of 10 dB.)
Dependencies/Couplings:	The reference level limits are determined in part by the External Gain, Max Mixer Level, RF Atten This key is grayed out in the SA Mode.

Input/Output

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 State
Min:	-50 dB
Max:	50 dB
Key Path:	Input/Output, Ext Gain
Instrument S/W Revision:	A.01.60 or later

BTS

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

Remote Command:	<code>[:SENSE]:CORRection:BTS[:RF]:GAIN <rel_amp1></code> <code>[:SENSE]:CORRection:BTS[:RF]:GAIN?</code>
Example:	<code>CORR:BTS:GAIN 10</code> sets the Ext Gain value to 10 dB <code>CORR:BTS:GAIN -10</code> sets the Ext Gain value to -10 dB (that is, a loss of 10 dB.)
Dependencies/Couplings:	The reference level limits are determined in part by the External Gain, Max Mixer Level, RF Atten This key is grayed out in the SA Mode.
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 State
Min:	-50 dB
Max:	50 dB
Key Path:	Input/Output, Ext Gain
Instrument S/W Revision:	A.01.60 or later

I Ext Gain

This function affects only the I channel input, except when the Input Path is I+jQ. In I+jQ this setting is applied to both I and Q channel inputs. It is not available unless the Baseband I/Q option (BBA) is installed.

Key Path	Input/Output, External Gain
Remote Command	<code>[:SENSE]:CORRection:IQ:I:GAIN <rel_amp1></code> <code>[:SENSE]:CORRection:IQ:I:GAIN?</code>

Preset	0 dB 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	-100 dB
Max	100 dB
Restriction and Notes	Not available unless option BBA is installed
Example	Set the I Ext Gain to 10 dB CORR:IQ:I:GAIN 10 Set the I Ext Gain to -10 dB (that is, a loss of 10 dB.) CORR:IQ:I:GAIN -10
Instrument S/W Revision	A.01.60 or later

Q Ext Gain

This function affects only the Q channel input and only when the Input Path is not I+jQ. It is not available unless the Baseband I/Q option (BBA) is installed.

Key Path	Input/Output, External Gain
Remote Command	[:SENSE] :CORRection:IQ:Q:GAIN <rel_ampl> [:SENSE] :CORRection:IQ:Q:GAIN?
Preset	0 dB 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	-100 dB
Max	100 dB
Restriction and Notes	Not available unless option BBA is installed
Example	Set the Q Ext Gain to 10 dB CORR:IQ:Q:GAIN 10 Set the Q Ext Gain to -10 dB (that is, a loss of 10 dB.) CORR:IQ:Q:GAIN -10
Instrument S/W Revision	A.01.60 or later

Restore Input/Output Defaults

This selection causes the group of settings and data associated with **Input/Output** key to be a reset to their default values. This level of Restore System Defaults does not affect any

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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.

Example:	:SYST:DEF INP presets all the Input/Output variables to their factory default values.
Remote Command Notes:	Please refer to the Utility Functions for information about Restore System Defaults and the complete description of the :SYSTem:DEFault INPut: command.
Key Path:	Input/Output
Instrument S/W Revision:	A.01.60 or later

Data Source

Gives you the choice of either using a hardware input signal as the input or raw data stored in a data storage buffer from an earlier acquisition. You can also share raw data across certain measurements that support this feature. The measurements must be capable of storing raw data. There are three choices under this menu. You can select "Inputs" which is the same as selecting one of the inputs from the input port, for example RF, AREF, I/Q, EXTMixer or IFALign. Selecting "Capture Buffer" allows you to use data that has been stored earlier in the same measurement or from a previous measurement using the "Current Meas -> Capture Buffer" feature. Selecting "Recorded Data" allows you to playback long data capture records stored in the record buffer.

When you make a recording (see **Record Data Now** below) or when you recall a recording (see the Recall section) the data source is automatically set to Recorded Data. You can toggle the data source between Inputs and the current Recording (if there is one). That is, the recording remains in memory until it is replaced by a new recording, or the application is closed.

Remote Command:	[:SENSe] :FEED:DATA INPut STORed RECorded [:SENSe] :FEED:DATA?
Example:	FEED:DATA REC FEED:DATA?
Dependencies/Couplings:	Not all inputs are available in all modes. Unavailable keys are grayed out.

Remote Command Notes:	INPutS = Inputs STORed = Capture Buffer RECOreded = Record Data Buffer
Preset:	This is unaffected by Preset but is set to INPut on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved:	Saved in state
Key Path:	Input/Output
Instrument S/W Revision:	A.01.60 or later

Inputs

Sets the measurement to use the input selections (RF, AREF, EXTMix, I/Q)

Example:	FEED:DATA INP causes the measurement to look at the input selection
Key Path:	Input/Output, Data Source
Instrument S/W Revision:	A.01.60 or later

Capture Buffer

Some WCDMA and demod measurements support this feature. This allows sharing of the raw data across certain measurements. If you want to make another measurement on the same signal, you would store that raw data using the "Current Meas -> Capture Buffer" key. Then the data is available for the next measurement to use. You must have raw data stored in the instrument memory before the Capture Buffer choice is available for use.

If you switch to a measurement that does not support this feature, then the instrument switches to use "Inputs" and grays out this key. If the grayed out key is pressed, it generates a message.

Example:	FEED:DATA STOR causes stored measurement data to be used with a different measurement that supports this.
Dependencies/Couplings:	Grayed out in the SA measurement.
Key Path:	Input/Output, Data Source
Instrument S/W Revision:	A.01.60 or later

Recorded Data

Directs the instrument to get data from the record data buffer in the measurement, rather

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than from the RF Input Signal.

Example:	FEED:DATA REC causes the measurement to extract data from the record data buffer
Dependencies/Couplings:	Grayed out in the SA measurement.
Key Path:	Input/Output, Data Source
Instrument S/W Revision:	A.01.60 or later

Current Meas -> Capture Buffer

Pressing this key stores the raw data of one measurement in the internal memory of the instrument where it can then be used by a different measurement by pressing "Stored Data". When raw data is stored, then data source selection switch automatically changes to "Stored Data". Stored raw data cannot be directly accessed by a user. There is no save/recall function to save the raw data in an external media. However if you want to get the stored raw data, you must first perform a measurement using the stored raw data. Now you can access the used raw data, which is the same as stored raw data, using the FETch or READ commands.

Remote Command:	[:SENSe] :FEED:DATA:STORe
Example:	FEED:DATA:STOR stores recorded data
Dependencies/Couplings:	Grayed out in the SA measurement.
Remote Command Notes:	This is command only, there is no query
Key Path:	Input/Output, Data Source
Instrument S/W Revision:	A.01.60 or later

Record Data Now

This causes the data source to change to Inputs (if it is not already set) and a recording is made with the current instrument setup. The length of the recording must be specified in advance.

This key changes to **Abort Recording** once the recording process has started. It changes back when the recording is complete.

The following dialogs show the progress of the recording:

This key is also available in the Sweep/Control menu.

Remote Command	[:SENSe] :RECOrding:INITiate[:IMMediate]
Example	REC:INIT
Dependencies/Couplings	Changes Data source to Recorded Data. Grayed out in the SA measurement.

Remote Command Notes	This is command only, there is no query. See the Recall functionality to access previously saved data.
Instrument S/W Revision	A.01.60 or later
Key Path	Input/Output, Data Source
Mode	VSA
Remote Command:	[:SENSe] :RECOrding:ABORt
Example:	REC:ABOR
Key Path:	Input/Output, Data Source
Remote Command Notes:	This is command only, there is no query. The command does nothing if it is sent when there is no recording in progress.
Instrument S/W Revision:	A.01.60 or later

Record Length

This specifies the length of the next recording. (You cannot use this to modify the length of the current recording.) The length defaults to seconds, but you can also specify it in points at the current sample rate, or in time records at the current time record length.

Remote Command	[:SENSe] :RECOrding:LENGth <real>, SECOnds RECOrds POINts [:SENSe] :RECOrding:LENGth:STATe MAX MANUal [:SENSe] :RECOrding:LENGth:STATe?
Example	REC:LENG 20,REC REC:LENG 4.1E-4,SEC REC:LENG:STAT MAX REC:LENG:STAT?
Remote Command Notes	There is no default unit. The unit must be specified. The length command does not have a query form. Length information is queried using the two commands following this table. If set to MAX, all of the available "recording memory" is used.
Instrument S/W Revision	A.01.60 or later
Key Path	Input/Output, Data Source
Mode	VSA
Preset	50 Records, Manual
State Saved	No
Min	0

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Max	Depends on memory available
Mode	VSA
Remote Command	<code>[:SENSe] :RECOrding:LENGth:VALue?</code>
Example	<code>REC:LENG:VAL?</code>
Preset	50 Records
Remote Command Notes	Query Only Returns the first (numeric) parameter of the most recent <code>[:SENSe] :RECOrding:LENGth</code> command.
Instrument S/W Revision	A.01.60 or later
Mode	VSA
Remote Command	<code>[:SENSe] :RECOrding:LENGth:UNIT?</code>
Example	<code>REC:LENG:UNIT?</code>
Preset	RECOrcs
Remote Command Notes	Query Only Returns the second parameter of the most recent <code>[:SENSe] :RECOrding:LENGth</code> command. Possible values are SEC REC POIN. If no second parameter was sent, then the return value is SEC.
Instrument S/W Revision	A.01.60 or later

Freq Ref In

Specifies the frequency reference as being the internal reference, external reference or sensing the presence of an external reference.

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, an error condition detected message is generated. When the external signal becomes valid, the error is cleared.

If Sense is selected, the instrument checks whether a signal is present at the external reference connector and will automatically switch to the external reference when a signal is detected. When no signal is present, it automatically switches to the internal reference. No message is generated as the reference switches between 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 2 in the Questionable Frequency register will be true and an error condition detected message is generated. When lock is regained, Status bit 2 in the Questionable Frequency register will be cleared and an error message is cleared will be sent.

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.

Remote Command:	<code>[:SENSE] :ROSCillator :SOURCE :TYPE INTernal EXTernal SENSE [:SENSe] :ROSCillator :SOURCE :TYPE?</code>
Preset:	This is unaffected by Preset but is set to SENSE on a "Restore Input/Output Defaults" or "Restore System Defaults->All".
State Saved:	Saved in State.
Key Path:	Input/Output
SCPI Status Bits/OPC Dependencies:	STATus:QUEStionable:FREQuency bit 2 set if unlocked.
Instrument S/W Revision:	A.01.60 or later

Remote Command:	<code>[:SENSe] :ROSCillator :SOURCE?</code>
Remote Command Notes:	The query [SENSe]:ROSCillator:SOURCE? returns the current switch setting. This means: <ol style="list-style-type: none"> 1. If it was set to SENSE but there is no external reference 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 EXTernal, then the query returns "EXTernal" 4. If it was set to INTernal, then the query returns INTernal
Preset:	SENSe
Instrument S/W Revision:	A.01.60 or later

Remote Command:	<code>[:SENSe] :ROSCillator :SOURCE INTernal EXTernal</code>
Instrument S/W Revision:	A.01.60 or later

Sense

The external reference is used if a valid signal is sensed at the Ext Ref input. Otherwise

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the internal reference is used.

Example: :ROSC:SOUR:TYPE SENS
Key Path: **Input/Output, Freq Ref In**
Instrument S/W Revision: A.01.60 or later

Internal

The internal reference is used.

Example: :ROSC:SOUR:TYPE INT
Key Path: **Input/Output, Freq Ref In**
Instrument S/W Revision: A.01.60 or later

External

The external reference is used.

Example: :ROSC:SOUR:TYPE EXT
Key Path: **Input/Output, Freq Ref In**
Instrument S/W Revision: A.01.60 or later

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 or external reference.)

For the instrument to stay locked, the value entered must be within 5 ppm of the actual ext ref 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.

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.

Preset: This is unaffected by Preset but is set to 10 MHz on a "Restore Input/Output Defaults" or "Restore System Defaults->All"

Min:	EXA: 10 MHz MXA: 1 MHz
Max:	EXA: 10 MHz MXA: 50 MHz
Key Path:	Input/Output, Freq Ref In
Default Unit:	Hz
Instrument S/W Revision:	A.01.60 or later

Output Config

Accesses keys that configure various output settings, like the frequency reference output, trigger output and analog output.

Instrument S/W Revision	A.01.60 or later
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Trig Out (1 and 2)

Select the type of output signal that will be output from the rear panel Trig 1 Out or Trig 2 Out connectors.

Remote Command:	:TRIGger TRIGger1 TRIGger2[:SEquence]:OUTPut HSWP MEASuring MAIN GATE GTRigger OEven :TRIGger TRIGger1 TRIGger2[:SEquence]:OUTPut?
------------------------	--

Example: TRIG:OUTP HSWP

Preset: Trigger 1: Sweeping (HSWP)

Trigger 2: Gate

This is unaffected by Preset but is preset to the above values on a "Restore Input/Output Defaults" or "Restore System Defaults->All"

State Saved: Saved in instrument state

Key Path: **Input/Output, Output Config**

Instrument S/W Revision: A.01.60 or later

Polarity Sets the output to the Trig 1 Out connector to trigger on either the positive or negative polarity.

Remote Command:	:TRIGger TRIGger1 TRIGger2[:SEquence]:OUTPut:POLarity POSitive NEGative :TRIGger TRIGger1 TRIGger2[:SEquence]:OUTPut:POLarity?
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Example: TRIG1:OUTP:POL POS

Input/Output

Preset: This is unaffected by Preset but is set to POSitive on a "Restore Input/Output Defaults" or "Restore System Defaults->All"

State Saved: Saved in state

Key Path: **Input/Output, Output Config, Trig 1 Output**

Instrument S/W Revision: A.01.60 or later

Sweeping (HSWP) Selects the Sweeping trigger signal to be output to the Trig 1 Out connector. This signal has historically been known as "HSWP" but care should be taken to understand that in this analyzer, its function does not exactly match other products behavior.

Example: TRIG1:OUTP HSWP

Key Path: **Input/Output, Output Config, Trig 1 Output**

Instrument S/W Revision: A.01.60 or later

Measuring Selects the Measuring trigger signal to be output to the Trig 1 Out connector. This signal is true while the Measuring status bit is true.

Example: TRIG1:OUTP MEAS

Key Path: **Input/Output, Output Config, Trig 1 Output**

Instrument S/W Revision: A.01.60 or later

Main Trigger Selects the current instrument trigger signal to be output to the Trig 1 Out connector.

Example: TRIG1:OUTP MAIN

Key Path: **Input/Output, Output Config, Trig 1 Output**

Instrument S/W Revision: A.01.60 or later

Gate Trigger Selects the gate trigger signal to be output to the Trig 1 Out connector. This is the source of the gate timing, not the actual gate signal.

Example: TRIG1:OUTP GTR

Key Path: **Input/Output, Output Config, Trig 1 Output**

Instrument S/W Revision: A.01.60 or later

Gate Selects the gate signal to be output to the Trig 1 Out connector. The gate signal has been delayed and its length determined by delay and length settings. When the polarity is positive, a high on the Trig 1 Out represents the time the gate is configured to pass the

signal.

Example: TRIG1:OUTP GATE
 Key Path: **Input/Output, Output Config, Trig 1 Output**
 Instrument S/W Revision: A.01.60 or later

Odd/Even Trace Point Selects either the odd or even trace points as the signal to be output to the Trig 1 Out connector when performing swept spectrum analysis. When the polarity is positive, this output goes high during the time the analyzer is sweeping past the first point (Point 0) and every other following trace point. The opposite is true if the polarity is negative.

Example: TRIG1:OUTP OEV
 Key Path: **Input/Output, Output Config, Trig 1 Output**
 Instrument S/W Revision: A.01.60 or later

Off Selects no signal to be output to the Trig 1 Out connector.

Example: TRIG1:OUTP OFF
 Key Path: **Input/Output, Output Config, Trig 1 Output**
 Instrument S/W Revision: A.01.60 or later

Digital Bus

Opens a menu that allows you to select options for configuring the digital bus output(s) of the analyzer.

Key Path **Input/Output, Output Config**
 Instrument S/W Revision A.01.60 or later

Bus Out The Digital Bus is a connector located on the rear panel of the instrument. It is a unidirectional link of real time raw ADC data at a 90 MHz rate. No corrections are applied. The ADC is sampling a 22.5 MHz IF. When Bus Out is on, all acquisitions are streamed to the output port including acquisitions for internal purposes such as Alignment; internal processing and routing of acquisitions continues as usual and is unaffected by the state of Bus Out. This port is intended for use with the Agilent N5105 and N5106 products only. It is not available for general purpose use.

Remote Command :OUTPut:DBUS[1][:STATe] ON|OFF|1|0
 :OUTPut:DBUS[1][:STATe]?

Example OUTP:DBUS ON
 Instrument S/W Revision A.01.60 or later

Input/Output

Key Path	Input/Output, Output Config, Digital Bus
Scope	Mode Global
Preset	This is unaffected by Preset but is set to Off on a "Restore Input/Output Defaults" or "Restore System Defaults -> All"
State Saved	Saved in instrument state.

I/Q Cal Out

The Baseband I/Q "Cal Out" port can be turned on with either a 1 kHz or a 250 kHz square wave. This can be turned on independent of the input selection. A Preset will reset this to Off.

Key Path	Input/Output, Output Config
Remote Command	:OUTPut:IQ:OUTPut IQ1 IQ250 OFF :OUTPut:IQ:OUTPut?
Preset	Off
State Saved	Saved in instrument state.
Range	1 kHz Square Wave 250 kHz Square Wave Off
Dependencies/Couplings	An I/Q Cable Calibration or an I/Q Probe Calibration will change the state of the Cal Out port as needed by the calibration routine. When the calibration is finished the I/Q Cal Out is restored to the pre-calibration state.
Example	OUTP:IQ:OUTP IQ1
Instrument S/W Revision	A.01.60 or later

1 kHz Square Wave Turn on the 1 kHz square wave signal at the Cal Out port. This choice is only available with option BBA.

Key Path	Input/Output, Output Config, I/Q Cal Out
Instrument S/W Revision	A.01.60 or later

250 kHz Square Wave Turn on the 250 kHz square wave signal at the Cal Out port. This choice is only available with option BBA.

Key Path	Input/Output, Output Config, I/Q Cal Out
Instrument S/W Revision	A.01.60 or later

Off Turn off the signal at the Cal Out port. This choice is only available with option BBA.

Key Path	Input/Output, Output Config, I/Q Cal Out
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Instrument S/W Revision A.01.60 or later

I/Q Guided Calibration

Calibrating the Baseband I/Q ports requires several steps and manual connections. The Guided Calibration will interactively step a user through the required steps, displaying diagrams to help with the connections. The steps will vary depending on the setup.

In the Guided Calibration windows, the date and time of the last calibration are displayed. If any of the items listed are displayed in yellow, this indicates that the calibration for that item is inconsistent with the latest calibration, and you should complete the entire calibration process before you exit the calibration.

I/Q Isolation Calibration

The I/Q Isolation Calibration must be run before calibrating any port with either the I/Q Cable Calibration or I/Q Probe Calibration. This calibration is performed with nothing connected to any of the front panel I/Q ports. This is the first step in both the I/Q Cable Calibration and the I/Q Probe Calibration.

Next Perform the I/Q Isolation calibration.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
State Saved	No.
Remote Command	:CALibration:IQ:ISOLation
Restriction and Notes	All front panel I/Q ports must not be connected to anything.
Remote Command Notes	All cables and probes should be disconnected from the I/Q ports before issuing the SCPI command.
Example	CAL:IQ:ISOL
Instrument S/W Revision	A.01.60 or later

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
Restriction and Notes	Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see “Exit Confirmation” on page 859).
Instrument S/W Revision	A.01.60 or later

I/Q Cable Calibration

The I/Q cable calibration creates correction data for each of the front panel I/Q ports. This calibration data is used whenever no probe specific calibration data is available. It is important that all ports are calibrated using the same short BNC cable so that the data is comparable from port to port.

The guided calibration (front panel only) will show connection diagrams and guide you through the isolation calibration and calibrating each port. The calibration data for each port is stored separately, so as soon as a port is calibrated that data is saved and will be used. If a user presses "Exit" to exit the calibration process, the data for the ports already completed will still be used. It is recommended that a calibration be completed once started, or if exited, that it be properly done before the next use of the I/Q ports. The "Next" button will perform the calibration for the current port and then proceed to the next step in the calibration procedure. The "Back" button will return to the prior port in the procedure. Both keys and dialog buttons are supplied for ease of use. The dialog buttons are for mouse use and the keys for front panel use.

The calibration can also be done via SCPI, but no connection diagrams will be shown. You will have to make the correct connections before issuing each port calibration command. Again, it is recommended that all ports be calibrated at the same time.

The instrument state remains as it was prior to entering the calibration procedure except while a port is actually being calibrated. Once a port is calibrated it returns to the prior state. A port calibration is in process only from the time the "Next" button is pressed until the next screen is shown. For SCPI, this corresponds to the time from issuing the CAL:IQ:FLAT:I | IB | Q | QB command until the operation is complete.

For example, if the prior instrument state is Cal Out = Off, Input = I+jQ, and Differential = Off, then up until the time the "Next" button is pressed the I Input and Q Input LEDs are on and the Cal Out, I-bar Input and Q-bar Input LEDs are off. Once the "Next" button is pressed for the I port calibration, only the Cal Out and I Input LEDs will be on and the others will be off. When the screen progresses to the next step ("Next" button again enabled), the prior state is restored and only the I Input and Q Input LEDs are on (Cal Out is off again).

The last calibration date and time for each port will be displayed. Any calibrations that are more than a day older than the most recent calibration will be displayed with the color amber.

I Port The I port calibration is performed with the front panel's I port connected via a short BNC cable to the Cal Out port. The guided calibration will show a diagram of the required connections.

Back Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Instrument S/W Revision	A.01.60 or later

Next Perform the I port calibration.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
State Saved	No.
Remote Command	:CALibration:IQ:FLATness:I
Restriction and Notes	The recommended procedure is to use the same BNC cable to calibrate all I/Q ports. All I/Q ports should be calibrated sequentially during the procedure. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands.
Remote Command Notes	The I port must be connected to the Cal Out port before issuing the SCPI command.
Example	CAL:IQ:FLAT:I
Instrument S/W Revision	A.01.60 or later

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
Restriction and Notes	Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see “Exit Confirmation” on page 859).
Instrument S/W Revision	A.01.60 or later

I-bar Port The I-bar port calibration is performed with the front panel's I-bar port connected via a short BNC cable to the Cal Out port. The guided calibration will show a diagram of the required connections.

Back Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
Restriction and Notes	Using the Back button will not restore the calibration data to a prior state. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. The Back button allows you to go back to a prior step to redo that calibration step.
Instrument S/W Revision	A.01.60 or later

Input/Output

Next Perform the I-bar port calibration.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
State Saved	No
Remote Command	:CALibration:IQ:FLATness:IBar
Restriction and Notes	<p>The recommended procedure is to use the same BNC cable to calibrate all I/Q ports. All I/Q ports should be calibrated sequentially during the procedure.</p> <p>The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands.</p>
Remote Command Notes	The I-bar port must be connected to the Cal Out port before issuing the SCPI command.
Example	CAL:IQ:FLAT:IB
Instrument S/W Revision	A.01.60 or later

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
Restriction and Notes	<p>Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step.</p> <p>When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see “Exit Confirmation” on page 859).</p>
Instrument S/W Revision	A.01.60 or later

Q Port The Q port calibration is performed with the front panel's Q port connected via a short BNC cable to the Cal Out port. The guided calibration will show a diagram of the required connections.

Back Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
Restriction and Notes	<p>Using the Back button will not restore the calibration data to a prior state. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. The Back button allows you to go back to a prior step to redo that calibration step.</p>
Instrument S/W Revision	A.01.60 or later

Next Perform the Q port calibration.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
State Saved	No
Remote Command	:CALibration:IQ:FLATness:Q
Restriction and Notes	The recommended procedure is to use the same BNC cable to calibrate all I/Q ports. All I/Q ports should be calibrated sequentially during the procedure. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands.
Remote Command Notes	The Q port must be connected to the Cal Out port before issuing the SCPI command.
Example	CAL:IQ:FLAT:Q
Instrument S/W Revision	A.01.60 or later

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
Restriction and Notes	Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see “Exit Confirmation” on page 859).
Instrument S/W Revision	A.01.60 or later

Q-bar Port The Q-bar port calibration is performed with the front panel's Q-bar port connected via a short BNC cable to the Cal Out port. The guided calibration will show a diagram of the required connections.

Back Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
Restriction and Notes	Using the Back button will not restore the calibration data to a prior state. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. The Back button allows you to go back to a prior step to redo that calibration step.
Instrument S/W Revision	A.01.60 or later

Input/Output

Next Perform the Q-bar port calibration.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
State Saved	No
Remote Command	:CALibration:IQ:FLATness:QBar
Restriction and Notes	<p>The recommended procedure is to use the same BNC cable to calibrate all I/Q ports. All I/Q ports should be calibrated sequentially during the procedure.</p> <p>The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands.</p>
Remote Command Notes	The Q-bar port must be connected to the Cal Out port before issuing the SCPI command.
Example	CAL:IQ:FLAT:QB
Instrument S/W Revision	A.01.60 or later

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
Restriction and Notes	<p>Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step.</p> <p>When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see “Exit Confirmation” on page 859).</p>
Instrument S/W Revision	A.01.60 or later

I/Q Probe Calibration

The I/Q probe calibration creates correction data for one of the front panel I/Q channels. When the probe has EEPROM identification, the data is unique to that specific probe. When the probe does not have EEPROM identification, the data will be used for all probes of the same type. The data is also unique to the channel, so calibration data for the I channel will not be used for the Q channel and vice versa.

The guided calibration (front panel only) will show connection diagrams and guide you through the I/Q Isolation Calibration and through calibrating each port. The calibration data for each port is stored separately, so as soon as a port is calibrated that data is saved and will be used. If a user presses "Exit" to exit the calibration process, the data for the port already completed will still be used. It is recommended that a calibration be completed once started, or if exited, that it be properly done before the next use of the probe. The "Next" button will perform the calibration for the current port and then proceed to the next step in the calibration procedure. The "Back" button will return to the prior

port in the procedure. Both keys and dialog buttons are supplied for ease of use. The dialog buttons are for mouse use and the keys for front panel use.

The calibration can also be done via SCPI, but no connection diagrams will be shown. You have to make the correct connections before issuing each port calibration command. Again, it is recommended that all ports be calibrated at the same time.

For Active probes or when Differential is Off, only the main port is calibrated, otherwise both the main and complementary ports are calibrated.

The instrument state remains as it was prior to entering the calibration procedure except while a port is actually being calibrated. Once a port is calibrated it returns to the prior state. A port calibration is in process only from the time the "Next" button is pressed until the next screen is shown. For SCPI, this corresponds to the time from issuing the CAL:IQ:PROB:I|IB|Q|QB command until the operation is complete.

For example, if the prior instrument state is Cal Out = Off, Input = I+jQ, and Differential = Off, then up until the time the "Next" button is pressed the I Input and Q Input LEDs are on and the Cal Out, I-bar Input and Q-bar Input LEDs are off. Once the "Next" button is pressed for the I port calibration, only the Cal Out and I Input LEDs are on and the others are off. When the screen progresses to the next step ("Next" button again enabled), the prior state is restored and only the I Input and Q Input LEDs are on (Cal Out is off again).

The last calibration date and time for each relevant port is displayed. For passive probes with Differential On, any calibration that is more than a day older than the most recent calibration is displayed with the color amber.

I Port The I port calibration is performed with the probe body attached to the front panel's I port and the probe tip connected via an adapter to the Cal Out port. The guided calibration shows a diagram of the required connections.

Show Adapter Show a connection diagram and instructions for the probe and adapter. See [“Show Adapter Screen” on page 859](#).

Key Path	Input/Output, I/Q, I Setup, I Probe, Calibrate
Restriction and Notes	Either a passive or an active probe adapter diagram is shown, depending on the type of probe attached.
Instrument S/W Revision	A.01.60 or later

Back Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Instrument S/W Revision	A.01.60 or later

Next Perform the I port calibration.

Key Path	Input/Output, I/Q, I Setup, I Probe, Calibrate
State Saved	No

Input/Output

Remote Command :CALibration:IQ:PROBe:I

Remote Command Notes The I port must be connected to the Cal Out port before issuing the SCPI command.

The calibration data is saved as soon as the port is calibrated and survives power cycles. It is not reset by any preset or restore data commands.

Example CAL:IQ:PROB:I

Instrument S/W Revision A.01.60 or later

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path **Input/Output, I/Q, I Setup, I Probe, Calibrate**

Restriction and Notes Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step.

When the calibration may be left in an inconsistent state, a confirmation dialog is displayed (see [“Exit Confirmation” on page 859](#)).

Instrument S/W Revision A.01.60 or later

I-bar Port The I-bar port calibration is performed with the probe body attached to the front panel's I-bar port and the probe tip connected via an adapter to the Cal Out port. The I-bar probe calibration is only available for passive probes with Differential On. The guided calibration shows a diagram of the required connections.

Show Adapter Show a connection diagram and instructions for the probe and adapter. See [“Show Adapter Screen” on page 859](#).

Key Path **Input/Output, I/Q, I Setup, I Probe, Calibrate**

Restriction and Notes Either a passive or an active probe adapter diagram is shown, depending on the type of probe attached.

Instrument S/W Revision A.01.60 or later

Back Return to the prior step in the calibration procedure.

Key Path **Input/Output, I/Q, I Setup, I Probe, Calibrate**

Restriction and Notes Using the Back button does restore the calibration data to a prior state. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. The Back button allows you to go back to a prior step to redo that calibration step.

Instrument S/W Revision A.01.60 or later

Next Perform the I-bar port calibration.

Key Path **Input/Output, I/Q, I Setup, I Probe, Calibrate**

State Saved No

Remote Command :CALibration:IQ:PROBe:IBar

Remote Command Notes The I-bar port must be connected to the Cal Out port before issuing the SCPI command.

The calibration data is saved as soon as the port is calibrated and survives power cycles. It is not reset by any preset or restore data commands.

Example CAL:IQ:PROB:IB

Instrument S/W Revision A.01.60 or later

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path **Input/Output, I/Q, I Setup, I Probe, Calibrate**

Restriction and Notes Using the Exit button does not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step.

When the calibration may be left in an inconsistent state, a confirmation dialog is displayed (see [“Exit Confirmation” on page 859](#)).

Instrument S/W Revision A.01.60 or later

Q Port The Q port calibration is performed with the probe body attached to the front panel's Q port and the probe tip connected via an adapter to the Cal Out port. The guided calibration shows a diagram of the required connections.

Show Adapter Show a connection diagram and instructions for the probe and adapter. See [“Show Adapter Screen” on page 859](#).

Key Path **Input/Output, I/Q, Q Setup, Q Probe, Calibrate**

Restriction and Notes Either a passive or an active probe adapter diagram is shown, depending on the type of probe attached.

Instrument S/W Revision A.01.60 or later

Back Return to the prior step in the calibration procedure.

Key Path **Input/Output, I/Q, Q Setup, Q Probe, Calibrate**

Input/Output

Instrument S/W Revision A.01.60 or later

Next Perform the Q port calibration.

Key Path **Input/Output, I/Q, Q Setup, Q Probe, Calibrate**

State Saved No

Remote Command :CALibration:IQ:PROBe:Q

Remote Command Notes The Q port must be connected to the Cal Out port before issuing the SCPI command.

The calibration data is saved as soon as the port is calibrated and survives power cycles. It is not reset by any preset or restore data commands.

Example CAL:IQ:PROB:Q

Instrument S/W Revision A.01.60 or later

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path **Input/Output, I/Q, Q Setup, Q Probe, Calibrate**

Restriction and Notes Using the Exit button does not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step.

When the calibration may be left in an inconsistent state, a confirmation dialog is displayed (see [“Exit Confirmation” on page 859](#)).

Instrument S/W Revision A.01.60 or later

Q-bar Port The Q-bar port calibration is performed with the probe body attached to the front panel's Q-bar port and the probe tip connected via an adapter to the Cal Out port. The Q-bar probe calibration is only available for passive probes with Differential On. The guided calibration shows a diagram of the required connections.

Show Adapter Show a connection diagram and instructions for the probe and adapter. See [“Show Adapter Screen” on page 859](#).

Key Path **Input/Output, I/Q, Q Setup, Q Probe, Calibrate**

Restriction and Notes Either a passive or an active probe adapter diagram is shown, depending on the type of probe attached.

Instrument S/W Revision A.01.60 or later

Back Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Restriction and Notes	Using the Back button does not restore the calibration data to a prior state. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. The Back button allows you to go back to a prior step to redo that calibration step.
Instrument S/W Revision	A.01.60 or later

Next Perform the Q-bar port calibration.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
State Saved	No
Remote Command	:CALibration:IQ:PROBe:QBar
Remote Command Notes	The Q-bar port must be connected to the Cal Out port before issuing the SCPI command. The calibration data is saved as soon as the port is calibrated and survives power cycles. It is not reset by any preset or restore data commands.
Example	CAL:IQ:PROB:QB
Instrument S/W Revision	A.01.60 or later

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Restriction and Notes	Using the Exit button does not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog is displayed (see “Exit Confirmation” on page 859).
Instrument S/W Revision	A.01.60 or later

Show Adapter Screen When one of the Probe Calibration Show Adapter buttons is pressed, a diagram of the probe with its adapter is shown. Depending on the type of probe attached, either the Passive Probe Adapter or the Active Probe Adapter diagram is shown.

Exit Confirmation

When Exit is pressed on one during one of the calibration routines, the calibration may be in an inconsistent state with some of the ports having newly measured calibration data

Input/Output

and others with old data. If this is the case, a dialog box appears to confirm that you really wants to exit. A "Yes" answer exits the calibration procedure, leaving potentially inconsistent calibration data in place. A "No" answer returns to the calibration procedure.

Recall

Recall functionality is common across multiple Modes and Measurements. These common features are described in this section.

The Recall feature prompts you to answer the questions: What do you want to recall? And to where do you want to recall it? Once these questions are answered the recall can occur. The options in this menu answer the question "What do you want to Recall?"

The options are State, Trace and Data. (Screen Image can be saved, but not recalled.) The default paths for Recall are data type dependent and are the same as for Save.

Key Path	Recall
Remote Command Notes	No remote command directly controls the Recall Type that this key controls. The Recall type is a node in the :MMEM:LOAD command. An example is :MMEM:LOAD:STATE <filename>.
Instrument S/W Revision	A.01.60 or later

State

Accesses a menu that enables you to recall a State that has previously been saved.

Recalling a saved state returns the analyzer as close as possible to the mode context and may cause a mode switch if the file selected is not for the current active mode. A State file can be recalled from either a register or a file. Once you pick the source of the recall in the State menu, the recall will occur.

When this key is pressed, you has determined what they want to recall is **State**. Recalling **State** is used to return as close as possible to the mode context of the save. Recalling State may cause a mode switch if the file selected is not for the currently active mode. This menu key will not actually cause the recall, since the recall feature still needs to know from where to recall the state. **State** can be recalled from either a register or a file. Pressing this key will bring up the State menu that provides you with the options of where to retrieve the state. For quick recalls, the State menu lists 6 registers to recall from or you can select a file to recall from.

Example	MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state.
Remote Command Notes	See "Open" on page 863 .
Instrument S/W Revision	A.01.60 or later
Key Path	Recall
Mode	All

Recall

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; so if a Trace was updating and visible when the State was saved, it will come back updating and visible; hence its data will be rewritten right away. So if using State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank before saving.

This creates the following table describing the Trace Save/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) 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 will, of course, have their data immediately overwritten.

Register 1 thru Register 6

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.

Registers are shared by all modes, so recalling from any one of the 6 registers may cause a mode switch to the mode that was active when the save to the Register occurred.

After the recall completes, the message "Register <register number> recalled" appears in the message bar.

Selecting any one of these register menu keys: **Register 1**, **Register 2**, **Register 3**, **Register 4**, **Register 5**, **Register 6** causes the state of the mode from the specified Register to be recalled. The registers are provided for easy saving and recalling, since you does not have to specify a filename or navigate to a specific file. The date will follow the format specified in the Date Format setting under the **Control Panel**. The time will show hours, minutes and seconds.

Key Path	Recall, State
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Example *RCL 1
 Instrument S/W Revision A.01.60 or later

Key Path **Recall, State**

Example *RCL 2
 Instrument S/W Revision A.01.60 or later

Key Path **Recall, State**

Example *RCL 3
 Instrument S/W Revision A.01.60 or later

Key Path **Recall, State**

Example *RCL 4
 Instrument S/W Revision A.01.60 or later

Key Path **Recall, State**

Example *RCL 5
 Instrument S/W Revision A.01.60 or later

Key Path **Recall, State**

Example *RCL 6
 Instrument S/W Revision A.01.60 or later

From File\ File Open

Brings up the File Open standard Windows® dialog and its corresponding **File Open** key menu.

When you first enter this dialog, the State File default path is in the Look In: box in this File Open dialog. The File Open dialog is loaded with the file information related to the State Save Type. The first *.state file is highlighted. The only files that are visible are the *.state files and the Files of type is *.state, since .state is the file suffix for the State Save Type. For more details, refer to [“File Open Dialog and Menu” on page 874](#).

Key Path **Recall, State**

Restriction and Notes Brings up Open dialog for recalling a State Save Type

Instrument S/W Revision A.01.60 or later

Open Recalling State function first must verify the file is recallable in the current instrument by checking the software version and model number of the instrument. If

Recall

everything matches, a full recall proceeds by aborting the currently running measurement, and then loading the State from the saved state file to as close as possible to the context in which the save occurred. 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 still tries to recall as much as possible and it returns a warning message of what it did.

No Trace data is loaded when recalling a State File. Measurements that support loading of trace data will include a Trace key in the Recall menu and will load State + Trace data from .trace files under that key.

Remote Command:	:MMEMory:LOAD:STATe <filename>
Example:	:MMEM:LOAD:STAT "myState.state" recalls the file myState.state on the default path
Restriction and Notes:	Auto return to the State menu and the Open dialog goes away. Advisory Event "Recalled File <file name>" after recall is complete.
Remote Command Notes:	Although the trace data is included in the .state file it is not recalled; that is left for .trace files only for measurements that support recalling of trace data. Errors are generated if the specified file is empty or does not exist, or there is a file type mismatch.

Key Path: **Recall, State, From File...**

Instrument S/W Revision: A.01.60 or later

The state of a mode includes all of the variables affected by doing a full preset. It not only recalls Mode Preset settings, but it also recalls all of the mode persistent settings and data if the mode has either. Each mode determines whether data is part of mode state and if the mode has any persistent settings. **Recall State** also recalls all of the **Input/Output** system settings, since they are saved with each State File for each mode.

The Recall State function does the following:

Verifies that the file is recallable on this instrument using the version number and model number.

Aborts the currently running measurement.

Clears any pending operations.

Switches to the mode of the selected Save State file.

Sets mode State and Input/Output system settings to the values in the selected Saved State file.

Limits settings that differ based on model number, licensing or version number.

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

Trace (+State)

When this key is pressed, you has determined what they want to recall is **Trace**. Trace files include the state of the mode they were saved from as well as the trace data, with internal flags to indicate which trace you was trying to save which may include ALL traces. They are otherwise identical to State files. Recalling **Trace** may cause a mode switch if the file selected is not for the currently active mode.

Not all modes support saving of trace data with the state; and for modes that do, not all measurements do. The Trace key is grayed out for measurements that do not support trace recall. It is blanked for modes that do not support trace recall.

This key will not actually cause the recall, since the recall feature still needs to know from which file to recall the trace and which trace to recall it into. Pressing this key will bring up the Recall Trace menu that provides you with the options of where to retrieve the trace.

For quick recalls, the Trace menu lists 5 registers to recall from or you can select a file to recall from.

Example	MMEM:LOAD:TRAC TRACE2,"MyTraceFile.trace" This loads the trace file data (on the default file directory path) into the specified trace. :MMEM:LOAD:TRAC:REG TRACE1,2 Restores the trace data in register 2 to Trace 1
Instrument S/W Revision	A.01.60 or later
Key Path	Recall
Mode	SA

Recall

Register 1 thru Register 5

Selecting any one of these register keys causes the Traces and State 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.

Trace registers are shared by all modes, so recalling from any one of the 5 registers may cause a mode switch to the mode that was active when the save to the Register occurred.

After the recall completes, the message "Trace Register <register number> recalled" appears in the message bar.

Selecting any one of these register menu keys: **Register 1**, **Register 2**, **Register 3**, **Register 4**, **Register 5** causes the traces and state of the mode from the specified Register to be recalled. The registers are provided for easy saving and recalling, since you does not have to specify a filename or navigate to a specific file. The date will follow the format specified in the Date Format setting under the **Control Panel**. The time will show hours, minutes and seconds.

Key Path	Recall, Trace
Instrument S/W Revision	A.01.60 or later

Key Path	Recall, Trace
Instrument S/W Revision	A.01.60 or later

Key Path	Recall, Trace
Instrument S/W Revision	A.01.60 or later

Key Path	Recall, Trace
Instrument S/W Revision	A.01.60 or later

Key Path	Recall, Trace
Instrument S/W Revision	A.01.60 or later

To Trace

These key selections let you pick which Trace to recall the saved trace into; either 1, 2, 3, 4, 5, or 6. Not all modes have the full 6 traces available. The default is the currently selected trace, selected in this menu or in the Trace/Det, Export Data, Import Data, or Save Trace menus, except if you have chosen All then it remains chosen until you specifically change it to a single trace.

If the .trace file is an "all trace" file, "**To Trace**" is ignored and the traces each go back to the trace they were saved from.

Once selected, the key returns back to the Recall Trace menu and the selected Trace number is annotated on the key. Now you have selected exactly where the trace needs to be

recalled. In order to trigger a recall of the selected Trace, you must select the **Open** key in the Recall Trace menu.

Key Path	Save, Data, Trace
Mode	SA
Instrument S/W Revision	A.01.60 or later

Open...

Pressing **Open** brings up the File Open standard Windows dialog and its corresponding File Open key menu. When you navigates to this selection, they have already determined they are recalling Trace and now they want to specify from which file to do the recall.

When you first enters this dialog, the State File default path is in the Look In: box in this File Open dialog. The File Open dialog is loaded with the file information related to the State Save Type. The first *.trace file is highlighted. Also, the only files that are visible are the *.trace files and the Files of type is *.trace, since .trace is the file suffix for the Trace Save Type. For more details, refer to [“File Open Dialog and Menu” on page 874](#).

Restriction and Notes	Brings up Open dialog for recalling a Trace Save Type
Instrument S/W Revision	A.01.60 or later
Key Path	Recall, Trace
Mode	SA

Open Recalling Trace first must verify the file is recallable in this instrument by checking instrument software version and model number, since it includes State. If everything matches, a full recall proceeds by aborting the currently running measurement, loads the state from the saved state file to as close as possible to the context in which the save occurred. Users can open .trace files from any mode that supports them, so recalling a Trace 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 and the saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.

Once the state is loaded the trace data must be loaded. The internal flags are consulted to see which trace to load and the "To Trace" setting to see where to load it. Trace data is always loaded with the specified trace set to View, so that the data is visible and not updating (so as not to wipe out the recalled data). If the file is an "all trace" file, all traces are loaded with the saved data (to the original trace the data was saved from) and set to View. Traces whose data is not loaded are restored to the update state that existed when they were saved.

In every other way a Trace load is identical to a State load. See section [“Open” on page 863](#) for details.

Key Path	Recall, Trace, Open...
----------	-------------------------------

Recall

Restriction and Notes	Auto return to the Trace menu and the Open dialog goes away. Advisory Event "Recalled File <file name>" after recall is complete.
Remote Command	<code>:MMEMory:LOAD:TRACe</code> <code>TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6, <filename></code> <code>:MMEMory:LOAD:TRACe:REGister</code> <code>TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6, <integer></code>
Remote Command Notes	Some modes and measurements do not have available all 6 traces. Phase Noise mode command, for example, is: <code>MMEMory:LOAD:TRACe TRACE1 TRACE2 TRACE3, <filename></code> The load trace command actually performs a load state, which in the Swept SA measurement includes the trace data. However it looks in the recalled state file to see how it was flagged at save time. The possibilities are: If the trace file was saved using one of the TRACE# enums, it is flagged as a single trace save file. The trace that was flagged as the one that was saved, is loaded to the trace specified. The trace is loaded with update off and display on, and none of the other traces are loaded. If the trace file was saved using one the ALL enum, it is flagged as an "all traces" file. And all traces will be loaded. All of the traces are loaded with Update=Off to keep them from updating, regardless of the setting of "Recall State w/Trace Update".
Example	<code>:MMEM:LOAD:TRAC TRACE2, "myState.trace"</code> recalls the file myState.trace on the default path; if it is a "single trace" save file, that trace is loaded to trace 2, and will is set to be not updating. <code>:MMEM:LOAD:TRAC:REG TRACE1,2</code> restores the trace data in register 2 to Trace 1
Instrument S/W Revision	A.01.60 or later

Data (Mode Specific)

Importing a data file loads data that was previously saved from the current measurement or from other measurements and/or modes that produce the same type of data. The Import Menu only contains Data Types that are supported by the current measurement.

For any given mode, the Export Data and Import Data menus match, but keys in Import Data are blanked if the data type is supported for Save but not for Recall.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Importing Data loads measurement data from the specified file into the specified or default destination, depending on the data type selected. Selecting an Import Data menu key will not actually cause the importing to occur, since the analyzer still needs to know from where to get the data. Pressing the Open key in this menu brings up the Open dialog and Open menu that provides you with the options from where to recall the data. Once a

filename has been selected or entered in the Open menu, the recall will occur as soon as the Open key is pressed. See [“File Open Dialog and Menu” on page 874](#) for more details.

Remote Command Notes	No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:LOAD commands.
Instrument S/W Revision	A.01.60 or later
Key Path	Recall
Mode	SA VSA
Preset	<mode specific>; Is not affected by Preset, but is reset during Restore Mode Defaults and survives subsequent running of the mode

Trace

This key selects the Traces as the data type to be imported with this recall request. It brings up the Trace Menu that lets you select which Trace to import the data into.

This key is grayed out when measurements are running that do not support trace importing.

For Vector Signal Analyzer Mode:

the trace data is loaded into the selected data register. Trace data registers are temporary storage places for trace data. They allow you to view past results next to current measurement results, and are also used in some functions like user defined filters. They are measurement global, so you can import data into a register while in the Digital Demod measurement and view it later while in the Vector measurement. Data registers are cleared when the measurement application is terminated, but not when you change Modes and return.

If the recalled file was saved with header information, the trace will initially be displayed with the same formatting and scaling as it had when it was saved. If headers are not saved, the scaling and format are set to defaults when the trace is recalled.

The following trace data formats may be imported:

Text and comma-separated variable (CSV)

Text

SDF.

Option 200 also allows import of these additional formats:

Matlab 4

Matlab 5

Matlab HDF5

Recall

N5110A compatible binary

Example	MMEM:LOAD:TRAC:DATA TRACE2,"MyTraceFile.csv" This loads the trace file data (on the default file directory path) into the specified trace.
Dependencies/Couplings	Trace data is not available from all Measurements. In that case, the key will be grayed out. The key will not show if no measurements in the Mode support it. For SA measurements, traces cannot be recalled from a trace file that was saved with ALL traces selected.
Instrument S/W Revision	A.01.60 or later
Key Path	Recall, Data
Mode	SA Analog Demod VSA
Preset	1; not part of Preset, but is reset by Restore Mode Defaults and survives power cycles
State Saved	Saved in State

Trace 1, 2, 3, 4, 5, 6 These keys let you pick which Trace to import the data into; either 1, 2, 3, 4, 5 or 6. The default is the currently selected trace, selected in this menu or in the Trace/Det, Export Data, Recall Trace, or Save Trace menus, except if you have chosen All then it remains chosen until you specifically change it to a single trace.

Once selected, the key returns back to the Import Data menu and the selected Trace number is annotated on the key. Now you have selected exactly what needs to be imported. In order to trigger a import of the selected trace, you must select the Open key in the Import Data menu.

An example of using this menu is: If you select 4 and continue to the File Open dialog, then import Trace 4 from the file selected or entered in File Name option in the File Open dialog.

Instrument S/W Revision	A.01.60 or later
Key Path	Recall, Data, Trace
Mode	SA VSA

Display in Selected Trace In Vector Signal Analyzer Mode, data registers are used as temporary storage places for trace data.

A register may be displayed in any trace. If "Display in Selected Trace" key is set to "Yes" then the data register into which the file is recalled is then assigned to the currently

selected trace.

Example	<p>Related command:</p> <p>MMEM:LOAD:TRAC:DATA D1,"TRC1.TXT",TXT</p> <p>This command explicitly puts the data in the specified trace.</p>
Instrument S/W Revision	A.01.60 or later
Key Path	Recall, Data (Import), Trace (to)
Mode	VSA

Capture Buffer

Capture Buffer functionality is not available for all measurements. The captured data is raw data (unprocessed).

Example	<p>MMEM:LOAD:CAPT "MyCaptureData.bin"</p> <p>This loads the file of capture data (on the default file directory path) into the instrument.</p>
Dependencies/Couplings	Capture buffer data is not available from all Measurements. In that case, the key will be grayed out. The key will not show if no measurements in the Mode support it.
Instrument S/W Revision	A.01.60 or later
Key Path	Recall, Data
Mode	WCDMA

Zone map

A map file contains zone definitions that will help simplify making measurements of frequently used signals. The OFDMA frame structure can contain multiple-zone definitions for the uplink and downlink subframes and multiple data burst allocations. You can recall map files in which you have saved complicated OFDMA frame analysis zone definitions; this can save you time and ensure the accuracy of repeat measurements. map files are also useful for recreating measurement settings so they can be used by other users.

Example	<p>MMEM:LOAD:ZMAP "MyZonemapFile.omf"</p> <p>This loads the file of zone map data (on the default file directory path) into the custom map.</p>
Dependencies/Couplings	Zone map data is not available from all Measurements. In that case, the key will be grayed out. The key will not show if no measurements in the Mode support it.
Instrument S/W Revision	A.01.60 or later
Key Path	Recall, Data

Recall

Mode OFDMA WIMAX

Recorded Data

This allows you to recall previously saved, recorded data for analysis.

This feature is only available with 89601X VSA Option 200 and Option G01.

Example MMEM:LOAD:REC "MyRecording.sdf"

Instrument S/W Revision A.01.60 or later

Key Path **Recall, Data (Import)**

Mode VSA

Notes Available file types are:

- CSV (Comma delimited) (*.csv)
- MAT-File (*.mat)
- MAT-File (Version 4) (*.mat)
- MAT-File (HDF5) (*.mat;*.hdf;*.h5)
- N5110A Waveform (*.bin)
- SDF (Fast) (*.sdf;*.dat)
- SDF (Export) (*.sdf;*.dat)
- Text (Tab delimited) (*.txt)

Open...

Pressing **File Open** brings up the File Open standard Windows dialog and the File Open key menu. When you navigates to this selection, they have already determined they are recalling a specific Data Type and now they want to specify which file to open.

When you first enter this dialog, the path is in the Look In: field in this File Open dialog depends on which import data type you navigated here from.

The only files that are visible are those specific to the file type being recalled.

Key Path **Recall, Data**

Restriction and Notes Brings up Open dialog for recalling a <mode specific> Save Type

Instrument S/W Revision A.01.60 or later

Open The import starts by checking for errors. Then the import can start. For all data types, the actual import starts by aborting the currently running measurement. Then the import does data type specific behavior:

Trace Import: A trace cannot be imported if the trace points in the file do not match the sweep points in the mode. If this happens, an error is generated. When a trace is imported, then **Trace Update** is always turned OFF for that trace and **Trace Display** is always

turned ON. The trace file has meta data. If the meta data in the file does not match the corresponding SA state, the dirty marker is displayed.

Mode	SA
Remote Command	:MMEMory:LOAD:TRACe:DATA TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6 , <filename>
Example	:MMEM:LOAD:TRAC DATA TRACE2,"myTrace2.csv" imports the 2nd trace from the file myTrace2.csv in the default path.
Remote Command Notes	Traces cannot be recalled from a trace data file that was saved with ALL traces selected. Errors are reported if the file is empty or missing, or if the file type does not match.

Instrument S/W Revision A.01.60 or later

Remote Command	:MMEMory:LOAD:TRACe:DATA D1 D2 D3 D4 D5 D6 , <filename> [, CSV TXT SDF]
Example	MMEM:LOAD:TRAC:DATA D1,"TRC1.TXT",TXT
Restriction and Notes	If you are not licensed to recall a particular file type, then an error –203.9010 will be returned. If the file format cannot be determined or the file cannot be recalled successfully, then an error –250.5290 is returned. If the recall is successful, then advisory message is shown.
Remote Command Notes	If the file format parameter is not included in the SCPI command, the file format is determined by the file name extension. If this is not sufficient, the file is scanned to determine the format.
Instrument S/W Revision	A.01.60 or later
Key Path	Recall, Data (Import), Trace (to), Open . . .
Mode	VSA

Recall captured data for reuse in demod measurements using the Load Capture Buffer functionality. This function is enabled for ‘Code Domain’ and ‘Modulation Accuracy’ measurements only.

Remote Command :MMEMory:LOAD:CAPTured <filename>

Recall

Restriction and Notes Errors are reported if the file is empty or missing, or if the file type does not match.

Example :MMEM:LOAD:CAPT "My Documents\WCDMA\data\IQ\captureBuffer\myCaptureBuffer.bin"

Instrument S/W Revision A.01.60 or later

Key Path **Recall, Data, File Open**

Mode WCDMA

Remote Command :MMEMory:LOAD:RECORDing <filename>

Example MMEM:LOAD:REC "MyRecording.sdf"

Remote Command Notes SCPI reflects the action performed when this key is selected and File Open is pressed.

Instrument S/W Revision A.01.60 or later

Key Path **Recall, Data (Import), Recorded Data, Open . . .**

Mode VSA

Remote Command :MMEMory:LOAD:ZMAP <filename>

Example :MMEM:LOAD:ZMAP "myZoneMap.omf" recalls the Zone map data from the file myZoneMap.omf on the default directory to the Custom map for Modulation Analysis measurement.

Instrument S/W Revision A.01.60 or later

Key Path **Recall, Data, Zone map**

Mode WIMAXOFDMA

File Open Dialog and Menu

The **File Open** is a standard Windows dialog and has a **File Open** key menu. Each key in this menu corresponds to the selectable items in the **File Open** dialog box. The menu keys can be used for easy navigation between the selections within the dialog or the standard **Tab** and **Arrow** keys can be used for dialog navigation. When you navigate to this selection,

you have already limited the file recall type and now you want to specify which file to open.

Instrument S/W Revision A.01.60 or later

Open

This selection and the **Enter** key when a filename has been selected or specified actually cause the load to occur. **Open** loads the specified or selected file to the previously selected recall type of either **State** or a specific import data type.

Restriction and Notes: Advisory Event "File <file name> recalled" after recall is complete.

Instrument S/W Revision: A.01.60 or later

File/Folder List

This menu key navigates to the center of the dialog that contains the list of files and folders. Once here you can get information about the file.

Key Path **Recall, <various>, Open...**

Restriction and Notes Pressing this key navigates you to the files and folders list in the center of the dialog.

Instrument S/W Revision A.01.60 or later

Sort

Pressing this key brings up the Sort menu that allows you a way to sort the files within the File Open scope. Only one sorting type can be selected at a time and the sorting happens immediately.

Key Path **Recall, <various>, Open..., Sort**

Remote Command Notes No SCPI command directly controls the sorting.

Instrument S/W Revision A.01.60 or later

By Date This allows you to sort the list of files within the scope of the File Open dialog in ascending or descending data order. The date is the last data modified.

Key Path **Recall, <various>, Open..., Sort**

Restriction and Notes Files in File Open dialog are sorted immediately in the selected order

Instrument S/W Revision A.01.60 or later

By Name This allows you to sort the list of files within the scope of the File Open dialog in

Recall

ascending or descending order based on the filename.

Key Path	Recall, <various>, Open..., Sort
Restriction and Notes	Files in File Open dialog are sorted immediately in the selected order
Instrument S/W Revision	A.01.60 or later

By Extension This allows you to sort the list of files within the scope of the File Open dialog in ascending or descending order based on the file extension for each file.

Key Path	Recall, <various>, Open..., Sort
Restriction and Notes	Files in File Open dialog are sorted immediately in the selected order
Instrument S/W Revision	A.01.60 or later

By Size This allows you to sort the list of files within the scope of the File Open dialog in ascending or descending order based on file size.

Key Path	Recall, <various>, Open..., Sort
Restriction and Notes	Files in File Open dialog are sorted immediately in the selected order
Instrument S/W Revision	A.01.60 or later

Ascending This causes the display of the file list to be sorted, according to the sort criteria above, in Ascending order.

Key Path	Recall, <various>, Open..., Sort
Restriction and Notes	Files in File Open dialog are sorted immediately in the selected order
Instrument S/W Revision	A.01.60 or later

Descending This causes the display of the file list to be sorted, according to the sort criteria above, in Descending order.

Key Path	Recall, <various>, Open..., Sort
Restriction and Notes	Files in File Open dialog are sorted immediately in the selected order
Instrument S/W Revision	A.01.60 or later

Files Of Type

This menu key corresponds to the Files Of Type selection in the dialog. It follows the

standard Windows supported Files Of Type behavior. It shows the current file suffix that corresponds to the type of file you have selected to save. If you navigated here from recalling State, "State File (*.state)" is in the dialog selection and is the only type available in the pull down menu. If you navigated here from recalling Trace, "Trace+State File (*.trace)" is in the dialog selection and is the only type available under the pull down menu. If you navigated here from importing a data file, "Data File (*.csv)" is in the dialog and is the only type available in the pull down menu. Modes can have other data file types and they would also be listed in the pull down menu.

Key Path	Recall, <various>, Open...
Restriction and Notes	Pressing this key causes the pull down menu to list all possible file types available in this context.
Instrument S/W Revision	A.01.60 or later

Up One Level

This menu key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. It follows the standard Windows supported Up One Level behavior. When pressed, it causes the file and folder list to navigate up one level in the directory structure.

Key Path	Recall, <various>, Open...
Restriction and Notes	When pressed, the file and folder list is directed up one level of folders and the new list of files and folders is displayed.
Instrument S/W Revision	A.01.60 or later

Cancel

This menu key corresponds to the Cancel selection in the dialog. It causes the current File Open request to be cancelled. It follows the standard Windows supported Cancel behavior.

Key Path	Recall, <various>, Open...
Restriction and Notes	Pressing this key causes the Open dialog to go away and auto return.
Instrument S/W Revision	A.01.60 or later

Recall

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/hold 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

Remote Command:	:INITiate[:IMMEDIATE]
Example:	:INIT:IMM
Dependencies/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.
Remote Command Notes:	:INITiate:RESTART :INITiate:IMMEDIATE Either of the above commands perform exactly the same function.
SCPI 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.
Instrument S/W Revision:	A.01.60 or later
Remote Command:	:INITiate:RESTART
Example:	:INIT:REST
Dependencies/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.
Remote Command Notes:	:INITiate:RESTART :INITiate:IMMEDIATE Either of the above commands perform exactly the same function.

Restart

SCPI Status Bits/OPC	This is an Overlapped command.
Dependencies:	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.
Instrument S/W Revision:	A.01.60 or later

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

Save functionality is common across multiple Modes and Measurements. These common features are described in this section.

The Save feature prompts you to essentially answer the questions: What do you want to save? And where do you want to save it? Once these questions are answered the save can occur. The options in this menu answer the question, "What do you want to save?"

Accesses a menu that provides the save type options. The **Save Type** options are **State**, **Trace**, **Data**, or a **Screen Image** depending on the active mode.

Remote Command Notes	No remote command for this key specifically.
Instrument S/W Revision	A.01.60 or later
Key Path	Save
Mode	All

State

Selects **State** as the save type and accesses a menu that provides the options of where to save. You can save either to a register or a file. This menu key will not actually cause the save until the location is chosen.

Saving the state is the only way to save this exact measurement context for the current active mode. The entire state of the active mode is saved in a way that when a recall is requested, the mode will return to as close as possible the context in which the save occurred. This includes all settings and data for only the current active mode.

It should be noted that the Input/Output settings will be saved when saving State, since these settings plus the state of the mode best characterize the current context of the mode, but the mode independent System settings will not be saved.

This key will not actually cause the save, since the save feature still needs to know where to save the state. Pressing this key will bring up the Save State menu that provides you with these options.

For rapid saving, the State menu lists registers to save to, or you can select a file to save to. Once they pick the destination of the save in the State menu, the save will occur.

Example	MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory.
Remote Command Notes	See "Save" on page 883 .
Instrument S/W Revision	A.01.60 or later
Key Path	Save

Save

Mode All

Register 1 thru Register 6

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.

These 6 registers are all that is available from the front panel for all modes in the instrument. There are not 6 registers available for each mode. From remote, 127 Registers are available. Registers are files that are visible to you in the My Documents\System folder.

Example *SAV 1
Instrument S/W Revision A.01.60 or later
Key Path **Save, State**
Mode All

Example *SAV 2
Instrument S/W Revision A.01.60 or later
Key Path **Save, State**
Mode All

Example *SAV 3
Instrument S/W Revision A.01.60 or later
Key Path **Save, State**
Mode All

Example *SAV 4
Instrument S/W Revision A.01.60 or later
Key Path **Save, State**
Mode All

Example *SAV 5
Instrument S/W Revision A.01.60 or later
Key Path **Save, State**
Mode All

Example	*SAV 6
Instrument S/W Revision	A.01.60 or later
Key Path	Save, State
Mode	All

To File . . .

Accesses a menu that enables you to select the location for saving the State. This menu is similar to a standard Windows® **Save As** dialog.

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). This path is the **Save In:** path in the **Save As** dialog for all State Files when they first enter this dialog.

Instrument S/W Revision	A.01.60 or later
Key Path	Save, State
Mode	All

Save As . . .

This menu lets you select the location where you can save the State. 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 key. See the Quick Save key documentation for more on the automatic file naming algorithm.

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).

When you first enter this dialog, the path in the **Save In:** field depends on the data type. The only files that are visible are the *.state files and the Save As type is *.state, since .state is the file suffix for the State Save Type.

Instrument S/W Revision	A.01.60 or later
Key Path	Save, State
Mode	All

Save Saves all of the State of the currently active mode plus the system level Input/Output

Save

settings to the specified file.

While the save is being performed, the floppy icon shows up in the settings bar near the Continuous/Single sweep icon. After the save completes, the Advisory Event "File <register number> saved" is displayed.

Remote Command	:MMEMory:STORe:STATe <filename>
Example	:MMEM:STOR:STAT "myState.state" saves the file myState.state on the default path
Restriction and Notes	If the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during a instrument software upgrade. Both single and double quotes are supported for any filename parameter over remote. Auto return to the State menu and the Save As dialog goes away.
Instrument S/W Revision	A.01.60 or later
Key Path	Save, State, To File...
Mode	All

Trace (+State)

Selects a state file which includes trace data for recalling as the save type and accesses a menu that enables you to select which trace to save. You can save to either a register or a file. Not all modes support saving trace data with the state; and for modes that do, not all measurements do. This key is grayed out for measurements that do not support trace saves. It is blanked for modes that do not support trace saves. Saving **Trace** is identical to saving State except a .trace extension is used on the file instead of .state, and internal flags are set in the file indicating which trace was saved. You may also select to save ALL traces.

This key will not actually cause the save, since the save feature still needs to know which trace to save and where to save it. Pressing this key will bring up the Save Trace menu that provides you with these options.

For rapid saving, the Trace menu lists registers to save to, or you can select a file to save to. Once you pick the destination of the save in the Trace menu, the save will occur.

Example	MMEM:STOR:STATe TRACE2,"MyTraceFile.trace" This stores trace 2 data in the file MyTraceFile.trace in the default directory. :MMEM:STOR:TRAC:REG TRACE1,2 stores trace 1 data in trace register 2 :MMEM:STOR:TRAC:REG ALL,3 saves the data for all 6 traces in trace register 3
Remote Command Notes	See "Save" on page 886 .
Instrument S/W Revision	A.01.60 or later

Key Path	Save
Mode	SA

Register 1 thru Register 5

Selecting any one of these register menu keys causes the Trace(s) specified under From Trace, along with the state of the currently active mode, to be saved to the specified Trace 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.

These 5 trace registers are all that is available for all modes in the instrument. At present, only the Swept SA measurement of the Spectrum Analyzer mode supports saving to Trace+State files. Registers are files that are visible to you in the My Documents\System folder.

Instrument S/W Revision	A.01.60 or later
Key Path	Save, Trace
Mode	SA

Instrument S/W Revision	A.01.60 or later
Key Path	Save, Trace
Mode	SA

Instrument S/W Revision	A.01.60 or later
Key Path	Save, Trace
Mode	SA

Instrument S/W Revision	A.01.60 or later
Key Path	Save, Trace
Mode	SA

Instrument S/W Revision	A.01.60 or later
Key Path	Save, Trace
Mode	SA

From Trace

Accesses a menu that enables you to select the trace to be saved. You can choose either 1, 2, 3, 4, 5, 6 or All. Not all modes have the full six traces. Once a trace is selected, the key returns back to the Save Trace menu and the selected trace number is annotated on the

Save

key. The default is the currently selected trace, selected in this menu or in the Trace/Det, Export Data, Import Data or Recall Trace menus, except if you have chosen All then it remains chosen until you specifically change it to a single trace. To save the Trace you must select **Save As**.

These keys let you pick which trace to save. Now you have selected exactly what needs to be saved. In order to trigger a save of the selected **Trace**, you must select the **Save As** key in the Save Trace menu.

Instrument S/W Revision	A.01.60 or later
Key Path	Save, Trace + State
Mode	SA

Save As . . .

This menu lets you select the location where you can save the Trace. It 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 key. See the Quick Save key documentation for more on the automatic file naming algorithm.

The default path for all State Files including .trace 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).

When you first enter this dialog, the path in the Save In: field depends on the data type. The only files that are visible are the *.trace files and the Save As type is *.trace, since .trace is the file suffix for the Trace Save Type.

Restriction and Notes	Brings up Save As dialog for saving a Trace Save Type
Instrument S/W Revision	A.01.60 or later
Key Path	Save, Trace (+State)
Mode	SA

Save This key initiates the save of the .trace file. All of the State of the currently active mode plus the system level Input/Output settings are saved to the specified file as well as all of the trace data, including internal flags set in the file indicating which trace is to be saved.

While the save is being performed, the floppy icon shows up in the settings bar near the Continuous/Single sweep icon. After the save completes, the Advisory Event "File <register

number> saved" is displayed.

Remote Command	<pre>:MMEMory:STORe:TRACe TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6 ALL, <filename> > :MMEMory:STORe:TRACe:REGister TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6 ALL, <integer></pre>
Example	<pre>:MMEM:STOR:TRAC TRACE1, "myState.trace" saves the file myState.trace on the default path and flags it as a "single trace" file with Trace 1 as the single trace (even though all of the traces are in fact stored). :MMEM:STOR:TRAC ALL, "myState.trace" saves the file myState.trace on the default path and flags it as an "all traces" file :MMEM:STOR:TRAC:REG TRACE1,2 stores trace 1 data in trace register 2</pre>
Remote Command Notes	<p>Some modes and measurements do not have available all 6 traces. The Phase Noise mode command, for example, is: MMEMory:STORe:TRACe TRACE1 TRACE2 TRACE3 ALL, <filename></p> <p>This command actually performs a save state, which in the Swept SA measurement includes the trace data. However it flags it (in the file) as a "save trace" file of the specified trace (or all traces).</p> <p>The range for the register parameter is 1–5</p>
Restriction and Notes	<p>If the file already exists, 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. Both single and double quotes are supported for any filename parameter over remote.</p> <p>Auto return to the State menu and the Save As dialog goes away.</p>
Instrument S/W Revision	A.01.60 or later
Key Path	Save, Trace, Save As...
Mode	SA

Data (Mode Specific)

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.

For any given mode, the Export Data and Import Data menus match, but keys in Import Data are blanked if the data type is supported for Save but not for Recall.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Save

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. See section “Save As . . .” on page 900 for more details.

Remote Command Notes	No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STOR commands.
Dependencies/Couplings	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 if there are no measurements in Mode that supports it.
Instrument S/W Revision	A.01.60 or later
Key Path	Save
Mode	All
Preset	<mode specific>; Is not affected by Preset, but is reset during Restore Mode Defaults and survives subsequent running of the mode.

Trace

Pressing this key selects Traces as the data type to be exported with this save request. Pressing this key when it is already selected brings up the Trace Menu, which allows you to select which Trace to save. This is the same as the Select Trace menu under Trace. The trace selected on that menu appears selected here, and selecting a trace here causes the same trace to be selected on the Select Trace menu. (That is, there is only one "selected trace".) This key is grayed out when measurements are running that do not support trace exporting.

Example	<pre>MMEM:STOR:TRAC:DATA TRACE3,"MyTraceFile.csv"</pre> <p>This stores the specified trace data in the file MyTraceFile.csv in the default directory.</p> <pre>VSA Example: MMEM:STOR:TRAC:DATA TRACE1,"Trc1.txt",TXT,ON</pre>
Remote Command Notes	See
Dependencies/Couplings	Trace data is not available from all Measurements. In that case, the key will be grayed out. The key will not show if no measurements in the Mode support it.
	For SA measurements, traces cannot be recalled from a trace file that was saved with ALL traces selected.
Instrument S/W Revision	A.01.60 or later

Key Path	Save, Data
Mode	SA Analog Demod VSA
Preset	Not part of Preset, but is reset by Restore Mode Defaults and survives power cycles.
State Saved	Saved in State

Trace selection These keys let you pick which Trace to save. The traces may have names, or they may be labeled 1, 2, 3, 4, 5, or 6, depending on the current mode. Once selected, the key returns back to the Export Data menu and the selected trace name/number is annotated on the key. The default is the currently selected trace, selected in this menu or in the Trace/Det, Import Data, Recall Trace or Save Trace menus, except if you have chosen All then it remains chosen until you specifically change it to a single trace.

In order to trigger a save of the selected trace, you must select the Save As key in the Export Data menu.

Some measurements have an "ALL" selection. This saves all six traces in one .csv file with the x-axis data in the first column and the individual trace data in succeeding columns. The header data and x-axis data in this file reflect the current settings of the measurement. Note that any traces which are in View or Blank may have different x-axis data than the current measurement settings; but this data will not be output to the file.

Instrument S/W Revision	A.01.60 or later
Key Path	Save, Data, Trace
Mode	SA Analog Demod VSA
Preset	The first trace key shown.

Include Header The trace header information includes enough state information to display the trace data with the same formatting and scaling when it is recalled. However, no other instrument state information is saved. If headers are not saved, the scaling and format are set to defaults when the trace is recalled.

Example	MMEM:STOR:TRAC:DATA TRACE1,"Trc1.txt",TXT,ON The On/Off setting is the last variable passed in the MMEMory:STORe:TRACe:DATA command.
Instrument S/W Revision	A.01.60 or later
Key Path	Save, Data, Trace
Mode	VSA
Preset	On

Measurement Results

Different types of results are available for each particular measurement. The results that

Save

are available are documented under the individual measurements. These measurement results are the same as the results that are returned when using the MEASure:<measurement> command (usually for sub-opcode 1).

Measurement results may not be available for all measurements.

Example	MMEM:STOR:RES "MyResultsFile.xml" This stores the measurement results data in the file MyResultsFile.xml in the default directory.
Remote Command Notes	See
Dependencies/Couplings	The key will not show if no measurements in the Mode support it.
Instrument S/W Revision	A.01.60 or later
Key Path	Save, Data
Mode	SA ADEMOD BASIC(IQ Analyzer) CDMA2K GSMEDGE PNOISE WCDMA WIMAXOFDMA TDSCDMA

Capture Buffer

Capture Buffer functionality is not available for all measurements. The captured data is raw data (unprocessed).

Example	MMEM:STOR:CAPT "MyCaptureData.bin" This stores the capture data in the file MyCaptureData.bin in the default directory.
Remote Command Notes	See
Dependencies/Couplings	The key will not show if no measurements in the Mode support it.
Instrument S/W Revision	A.01.60 or later
Key Path	Save, Data
Mode	WCDMA

Zone map

A map file contains zone definitions that will help simplify making measurements of frequently used signals. The OFDMA frame structure can contain multiple-zone definitions for the uplink and downlink subframes and multiple data burst allocations. You can store map files in which you have saved complicated OFDMA frame analysis zone definitions. This can save you time and ensure the accuracy of repeated measurements. map files are also useful for recreating measurement settings so they can be used by other

users.

Example	MMEM:STOR:ZMAP "MyZonemapFile.omf" This stores the zone map data in the file MyZonemapFile.omf in the default directory.
Remote Command Notes	See
Dependencies/Couplings	The key will not show if no measurements in the Mode support it.
Instrument S/W Revision	A.01.60 or later
Key Path	Save, Data
Mode	OFDMA WiMAX

Recorded Data

Saving recorded data is not available for all measurements. Recorded data, and the optional header info, may be recalled later (or transferred to another instrument) for analysis.

This function is available in 89601X VSA Option 200, but not in Option 205.

Example	MMEM:STOR:REC "MyRecording.sdf",SDF,ON,ON,OFF
Restriction and Notes	Grayed out unless there is recorded data in the buffer.
Instrument S/W Revision	A.01.60 or later
Key Path	Save, Data (Export)
Mode	VSA

Save As . . .

This menu lets you select the location where you can save Data Type files. It 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 key. See the Quick Save key documentation for more on the automatic file naming algorithm.

When you first enter this dialog, the path in the Save In: field depends on the data type. The only files that are visible are the files with the corresponding data type suffix, and the **Save As** type lists the same suffix.

For example, if the Data Type is **Amplitude Corrections**, the file suffix is .csv and the *.csv files are the only visible files in the **Save As** dialog and .csv is the Save As Type.

The default path for saving files is:

For all of the Trace Data Files:

Save

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

Restriction and Notes	Brings up Save As dialog for saving a <code><mode specific></code> Save Type
Instrument S/W Revision	A.01.60 or later
Key Path	Save, Data
Mode	All

Save Saves the specified Data Type. This section describes any specific save behavior relevant to Data that is common to all modes.

When a Save of a specific Data File is requested, the specified data is saved to the specified or selected file. The save is performed immediately and does not wait until the measurement is complete.

If the file already exists, a dialog will popup that allows you to replace the existing file by selecting an **OK** or you can **Cancel** the request.

While the save is being performed, the floppy icon will show up in the settings bar near the Continuous/Single icon. After a register save completes, the corresponding register key annotation is updated with the date the time and an advisory message that the file was saved appears in the message bar.

Key Path	Save, Data, Save As...
Restriction and Notes	If the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during a instrument software upgrade. Both single and double quotes are supported for any filename parameter over remote.
Instrument S/W Revision	A.01.60 or later
Mode	SA ADEMOD BASIC(IQ Analyzer) CDMA2K GSMEDGE PNOISE WCDMA WIMAXOFDMA TDSCDMA

Remote Command	<code>:MMEMory:STORe:RESults <filename></code>
Example	<p><code>:MMEM:STOR:RES "myResults.csv"</code> saves the results from the current measurement to the file <code>myResults.csv</code> in the default path.</p> <p><code>:MMEM:STOR:RES</code></p> <p><code>"MyDocuments\Basic\data\ComplexSpectrum\results\myResults.xml"</code> saves the results from the current measurement (Complex Spectrum) to the file <code>myResults.xml</code> in the default path for IQ Analyzer (Basic) Mode.</p> <p>This command form is not supported for the Swept SA measurement; see below.</p>
Instrument S/W Revision	A.01.60 or later
Remote Command	<code>:MMEMory:STORe:RESults:MTABle PTABle <filename></code>
Example	<p><code>:MMEM:STOR:RES:MTAB "myResults.csv"</code> saves the results from the current marker table to the file <code>myResults.csv</code> in the default path.</p> <p><code>:MMEM:STOR:RES:PTAB "myResults.csv"</code> saves the results from the current peak table to the file <code>myResults.csv</code> in the default path.</p> <p>This command form is only supported for the Swept SA measurement; see above.</p>
Dependencies/Couplings	<p>If a save of Marker Table results is requested and the Marker Table is not on, no file is saved an error is generated:</p> <p>Mass Storage error; Mkr Table must be on to save Mkr Table as Meas Results</p> <p>If a save of Peak Table results is requested and the Peak Table is not on, no file is saved an error is generated:</p> <p>Mass Storage error; Pk Table must be on to save Pk Table as Meas Results</p>
Instrument S/W Revision	A.01.60 or later
Mode	SA
Preset	Peak Table
State Saved	Saved in State
Range	Peak Table Marker Table
Mode	SA Analog Demod
Remote Command	<code>:MMEMory:STORe:TRACe:DATA</code> <code>TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6 ALL, <filename></code>
Example	<code>:MMEM:STOR:TRAC:DATA TRACE2,"myTrace2.csv"</code> exports the 2nd trace to the file <code>myTrace2.csv</code> in the default path.

Save

Remote Command Notes	<p>Not all measurements have the ALL selection. Traces cannot be recalled from files that were saved using the ALL selection.</p> <p>If the save is initiated via SCPI, and the file already exists, the file will be overwritten.</p> <p>Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade. Both single and double quotes are supported for any filename parameter over remote.</p>
Instrument S/W Revision	A.01.60 or later
Trace Number	Analog Demod Mode: Trace Names
TRACE1	RF Spectrum
TRACE2	Demod
TRACE3	Demod Ave
TRACE4	Demod Max
TRACE5	Demod Min
TRACE6	AF Spectrum
Mode	VSA
Remote Command	<pre>:MMEMory:STORe:TRACe:DATA TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6,"<filename>" [,CSV TXT SDF[,OFF ON 0 1]]</pre>
Example	<pre>MMEM:STOR:TRAC:DATA TRACE1,"Trc1.txt",TXT,ON</pre>
Restriction and Notes	<p>If you are not licensed to save a particular file type, then an error will be returned. If an invalid file format is specified or the file cannot be saved successfully, then an error is returned.</p> <p>8901X Option 205 allows export in TXT, CSV, and SDF formats.</p> <p>8901X Option 200 allows the Option 205 formats and additionally: Matlab 4, 5 and HDF5, and an N5110A compatible binary format.</p>
Remote Command Notes	<p>File format is selected by the second parameter, but no default extension is appended to the filename. If the second parameter is not supplied, then the filename extension is used to determine the format. *.mat selects Matlab 5 format. *.sdf, or an unrecognized extension chooses the SDF fast format.</p> <p>The optional Boolean determines if the file is saved with headers. By default the headers are saved.</p>
Instrument S/W Revision	A.01.60 or later

Save

Remote Command Notes	<p>Recorded data must be available in the buffer.</p> <p>File format is selected by the second parameter, but no default extension is appended to the filename. If the second parameter is not supplied, then the filename extension is used to determine the format. *.mat selects Matlab 5 format. *.sdf, or an unrecognized extension chooses the SDF fast format.</p> <p>The three optional Booleans determine if:</p> <ol style="list-style-type: none">1. file is saved with headers2. data is resampled to the current span before saving3. player position settings limit the data saved
Instrument S/W Revision	A.01.60 or later

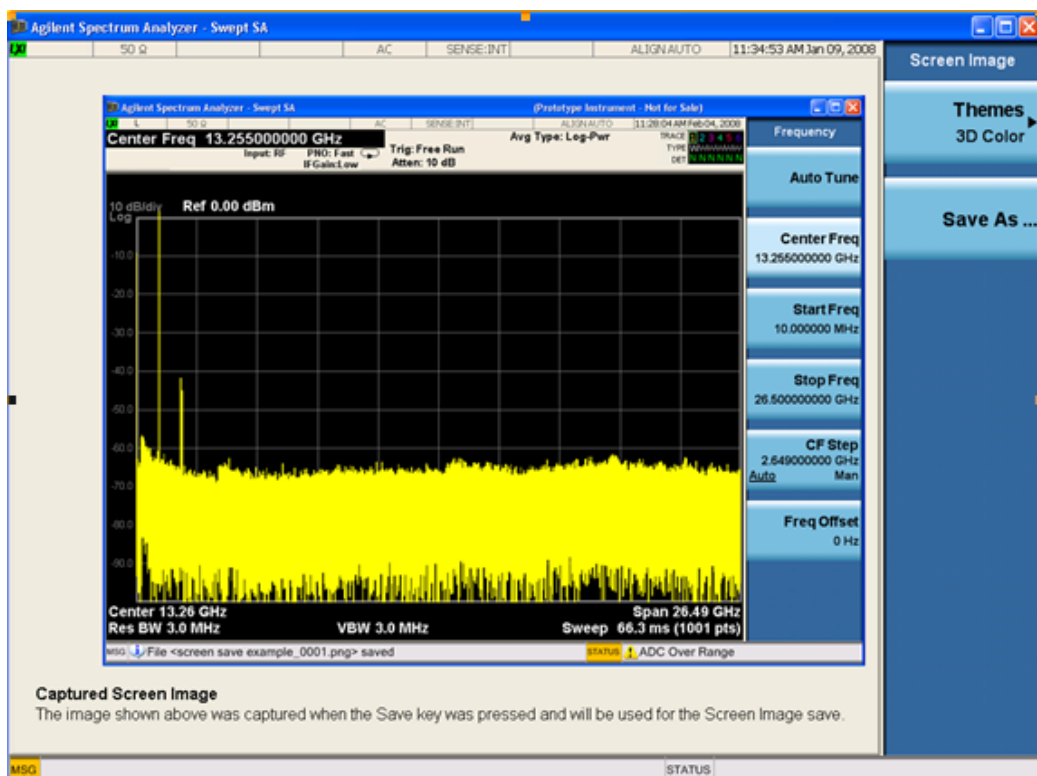
Screen Image

Accesses a menu of functions that enable you to specify a format and location for the saved screen image.

Pressing Screen Image brings up a menu which 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 asks 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.

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.

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 keys, not the menus and the active function that were on the screen when you first pressed the Save front-panel key.

Example	MMEM:STOR:SCR "MyScreenFile.png"
	This stores the current screen image in the file MyScreenFile.png in the default directory.
Remote Command Notes	See
Instrument S/W Revision	A.01.60 or later
Key Path	Save
Mode	All

Save

Themes

Accesses a menu of function 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 pick 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?
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
Example	:MMEM:STOR:SCR:THEM TDM
Instrument S/W Revision	A.01.60 or later

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
Instrument S/W Revision	A.01.60 or later

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
Instrument S/W Revision	A.01.60 or later

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
Instrument S/W Revision	A.01.60 or later

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
Instrument S/W Revision	A.01.60 or later

Save As...

Accesses a menu that enables you to select the location where you can save the Screen Image. This menu is a standard Windows® dialog with Save As menu keys. The **Save As** dialog is loaded with the file information related to the Screen Image Type. The filename is filled in using the auto file naming algorithm for the Screen Image Type and is highlighted. The only files that are visible are the *.png files and the Save As Type is *.png, since .png is the file suffix for the Screen Image Type.

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).

This path is the **Save In:** path in the **Save As** dialog for all Screen Files when you first enters this dialog.

Key Path	Save, Screen Image
Restriction and Notes	Brings up Save As dialog for saving a Screen Image Save Type
Instrument S/W Revision	A.01.60 or later

Save Saves the screen image to the specified file using the selected theme. The image that is saved is the measurement display prior to when the **Save As** dialog appeared. The save is performed immediately and does not wait until the measurement is complete.

Remote Command:	:MMEMory:STORe:SCReen <filename>
Example:	:MMEM:STOR:SCR "myScreen.png"
Restriction and Notes:	If the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during a instrument software upgrade. Both single and double quotes are supported for any filename parameter over remote. Auto return to the Screen Image menu and the Save As dialog goes away. Advisory Event "File <file name> saved" after save is complete.
Key Path:	Save, Screen Image, Save As...
Instrument S/W Revision:	A.01.60 or later

Save

Save As . . .

The **Save As** is a standard Windows dialog and with the **Save As** key menu. 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 key. See the Quick Save key documentation for more on the automatic file naming algorithm.

The **Save As** dialog will have the last path loaded in **Save In:** for this particular file type. User specified paths are remembered and persist through subsequent runs of the mode. These remembered paths are mode specific and are reset back to the default using **Restore Mode Defaults**.

Instrument S/W Revision A.01.60 or later

Save

Performs the actual save to the specified file of the selected type. The act of saving does not affect the currently running measurement and does not require you to be in single measurement mode to request a save. It performs the save as soon as the currently running measurement is in the idle state; when the measurement completes. This ensures the State or Data that is saved includes complete data for the current settings. The save only waits for the measurement to complete when the state or data that depends on the measurement setup is being saved. The save happens immediately when exporting corrections or when saving a screen image.

If the file already exists, a dialog will popup with corresponding menu keys that allows you to replace the existing file with an **OK** or to **Cancel** the request.

While the save is being performed, the floppy icon shows up in the settings bar near the Continuous/Single icon. After the save completes, the corresponding register menu key annotation is updated with the date the time and the message "File <file name> saved" appears in the message bar.

Restriction and Notes: If the file already exists, the File Exist dialog pops up and allows you to replace it or not by selecting the Yes or No menu keys that appear with the dialog. Then the key causes an auto return and Save As dialog goes away.

Advisory Event "File <file name> saved" after save is complete.

Instrument S/W Revision: A.01.60 or later

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.

Key Path **Save, <various>, Save As...**

Restriction and Notes	Pressing this key navigates you to the files and folders list in the center of the dialog.
-----------------------	--

Instrument S/W Revision	A.01.60 or later
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File Name

Brings up the Alpha Editor as shown in the screen image. Use the knob to choose the letter to add and the Enter front-panel key to add the letter to the file name. In addition to the list of alpha characters, this editor includes a **Space** menu key and a **Done** menu key. The **Done** menu key completes the filename, removes the Alpha Editor and returns back to the **File Open** dialog and menu, but does not cause the save to occur. You can also use **Enter** to complete the file name entry and this will cause the save to occur.

Key Path	Save, <various>, Save As...
----------	--

Restriction and Notes	Brings up the Alpha Editor. Editor created file name is loaded in the File name field of the Save As dialog.
-----------------------	--

Instrument S/W Revision	A.01.60 or later
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Save As Type

This key corresponds to the **Save As Type** selection in the dialog. It follows the standard Windows® supported **Save As Type** behavior. It shows the current file suffix that corresponds to the type of file you have selected to save. If you navigated here from saving State, "State File (*.state)" is in the dialog selection and is the only type available under the pull down menu. If you navigated here from saving Trace, "Trace+State File (*.trace)" is in the dialog selection and is the only type available under the pull down menu. If you navigated here from exporting a data file, "Data File (*.csv)" is in the dialog and is available in the pull down menu. Modes can have other data file types and they would also be listed in the pull down menu.

Key Path	Save, <various>, Save As...
----------	--

Restriction and Notes	Pressing this key causes the pull down menu to list all possible file types available in this context. All types available are loaded in a 1-of-N menu key for easy navigation.
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Instrument S/W Revision	A.01.60 or later
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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. It follows the standard Windows® supported **Up One Level** behavior. When pressed, it causes the file and folder list to navigate up one level in the directory structure.

Key Path	Save, <various>, Save As...
----------	--

Restriction and Notes	When pressed, the file and folder list is directed up one level of folders and the new list of files and folders is displayed
-----------------------	---

Save

Instrument S/W Revision A.01.60 or later

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. It follows the standard Windows® supported **Create New Folder** behavior. When pressed, a new folder is created in the current directory with the name **New Folder** and allows you to enter a new folder name using the Alpha Editor.

Key Path	Save, <various>, Save As...
Restriction and Notes	Creates a new folder in the current folder and lets you fill in the folder name using the Alpha Editor.
Instrument S/W Revision	A.01.60 or later

Cancel

This key corresponds to the **Cancel** selection in the dialog. It follows the standard Windows supported **Cancel** behavior. It causes the current **Save As** request to be cancelled.

Key Path	Save, <various>, Save As...
Restriction and Notes	Pressing this key causes the Save As dialog to go away and auto return.
Instrument S/W Revision	A.01.60 or later

Save

Single (Single Measurement/Sweep)

Single 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.

Example: `:INIT:CONT OFF`

Remote Command Notes: See **Cont** key description.

Key Path: **Front-panel key**

Instrument S/W Revision: A.01.60 or later

Single (Single Measurement/Sweep)

Sweep / Control

This section describes the keys in the Sweep, Control and Capture menu that are common to multiple Modes and Measurements. See the Measurement descriptions for information on features that are unique.

NOTE The Meas Uncal (measurement uncalibrated) warning is given in the Status Bar in the lower right corner of the screen when the manual sweep time entered is too fast to give accurate measurements with the current setting of Res BW. When this happens, increase the Sweep Time or the Res BW.

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Abort (Remote Command Only)

This command is used to stop the current measurement. It aborts the current measurement as quickly as possible, resets the sweep and trigger systems, and puts the measurement into an "idle" state. If the analyzer is in the process of aligning when ABORT is sent, the alignment finishes before the abort function is performed. So ABORT does not abort an alignment.

If the analyzer is set for Continuous measurement, it 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 set for Single measurement, it remains in the "idle" state until an :INIT:IMM command is received.

Remote Command:	:ABORT
Example:	:ABOR
Dependencies/Couplings:	For continuous measurement, ABORT is equivalent to the Restart key. Not all measurements support the abort command.
Remote Command Notes:	If :INITiate:CONTinuous is ON, then a new continuous measurement will start immediately; with sweep (data acquisition) occurring once the trigger condition has been met. If :INITiate:CONTinuous is OFF, then :INITiate:IMMEDIATE is used to start a single measurement; with sweep (data acquisition) occurring once the trigger condition has been met.

Sweep / Control

SCPI Status Bits/OPC Dependencies:	The STATus:OPERation register bits 0 through 8 are cleared. The STATus:QUEStionable register bit 9 (INTEgrity sum) is cleared. Since all the bits that feed into OPC are cleared by the ABORt, the ABORt will cause the *OPC query to return true.
Instrument S/W Revision:	A.01.60 or later

Pause/Resume

Pauses a measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing Resume un-pauses the measurement. When you are Paused, pressing **Restart**, **Single** or **Cont** does a Resume.

Remote Command:	:INITiate:PAUSE
Dependencies/Couplings:	Grayed out in Measurements that don't support Pausing. Blanked in Modes that don't support Pausing.
Key Path:	Sweep/Control
Instrument S/W Revision:	A.01.60 or later

Remote Command:	:INITiate:RESume
Dependencies/Couplings:	Grayed out in Measurements that don't support Pausing. Blanked in Modes that don't support Pausing.
Key Path:	Sweep/Control
Instrument S/W Revision:	A.01.60 or later

Record Data Now

This key makes a data recording using input at the current frequency settings. This key is a duplicate of the Record Data Now key in the Input/Output, Data Source menu. It is included in this menu as a convenience to be near the playback and pause functions that it is often used with. [“Record Data Now” on page 908](#)

Some settings of the recorded data can be queried remotely, like center frequency, span, rate, length, and data type. See [“Querying Recording Information” on page 911](#).

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Playback (Recorded Data)

Accesses controls for the playback of a recording. A recording is a long buffer of contiguous time samples together with meta-data about the sample rate and other related state properties at the time it was made. It may be saved and recalled from a file. A recording is typically much longer than a single measurement time record.

When the instrument data source is recorded data (see Input/Output, Data Source), a measurement takes a complete time record from the recording buffer starting at the current playback position. Then the playback position pointer is moved ahead from 1 to 100% of the current time record length, depending on whether overlap processing is allowed. Data is taken sequentially from the recording until the play position is less than a time record length away from the time stored in the Stop Time property. The measurement can be made to pause at this point, or to loop back to the beginning and continue if more time records are needed. (It resets the play position to the Start Time for this loop back functionality.) Initially the Start Time and Stop Time properties are set to the beginning and end of the recording, but they can be restricted to a portion of it.

Some settings of the recorded data can be queried remotely, like center frequency, span, rate, length, and data type. See [“Querying Recording Information” on page 911](#).

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Playback Position

This lets you to view or change the current playback position. It is not an active function, so the arrow keys and knob have no effect on it. It must be entered numerically.

Remote Command:	[:SENSe]RECOrding:PLAYback:POSition <time> [:SENSe]RECOrding:PLAYback:POSition?
Example:	REC:PLAY:POS 1 US
Dependencies/Couplings:	Measurement restart sets this back to the Start Time (minus any points needed for settling the measurement)
Preset:	0
Min:	0
Max:	End of recording
Key Path:	Sweep/Control, Playback
Instrument S/W Revision:	A.01.60 or later

Start Time

This is where the playback position is set to when a measurement is restarted, or loops back from the end

Sweep / Control

of the recording.

Remote Command: [:SENSe]RECORDing:PLAYback:START <time>
[:SENSe]RECORDing:PLAYback:START?
[:SENSe]RECORDing:PLAYback:START:AUTO OFF|ON|0|1
[:SENSe]RECORDing:PLAYback:START:AUTO?

Example: REC:PLAY:STAR 2 US
REC:PLAY:STAR:AUTO ON

Dependencies/Couplings: If Start Time is set after the current play position, then the play position is updated to the new start time at the next measurement. If this is set greater than the stop time and a measurement is started, an error is generated.
Setting the start time via front panel or SCPI forces this to Man. Recalling a recording file or making a new recording sets this to Auto

Remote Command Notes: Selecting Auto sets the Start Time to 0
Preset: On, 0 s
State Saved: No
Min: 0
Max: End of recording
Key Path: Sweep/Control, Playback
Instrument S/W Revision: A.01.60 or later

Stop Time

No measurement data will be taken after this position in the recording buffer. If there is not a complete time record length between the playback position and the stop time, the measurement either pauses or loops back to the start time setting. The Loop at End setting determines which of these it does.

Remote Command: [:SENSe]RECORDing:PLAYback:STOP <time>
[:SENSe]RECORDing:PLAYback:STOP?
[:SENSe]RECORDing:PLAYback:STOP:AUTO OFF|ON|0|1
[:SENSe]RECORDing:PLAYback:STOP:AUTO?

Example: REC:PLAY:STOP 2 US
REC:PLAY:STOP:AUTO ON

Dependencies/Couplings:	If Stop Time is set prior to the current play position plus time record length, then the play position loops back to the Start time at the next measurement. If this is set less than the start time and a measurement is started, an error is generated Setting the stop time via front panel or SCPI forces this to Manual. Recalling a recording file or making a new recording sets this to auto
Remote Command Notes:	Selecting Auto sets the Stop Time to the end of the data.
Preset:	End of recording, Auto On
State Saved:	No
Min:	0
Max:	End of recording
Key Path:	Sweep/Control, Playback
Instrument S/W Revision:	A.01.60 or later

Loop at End

This setting determines whether the measurement stops, or resets the play position back to the start time, when there is not enough data left between the playback position and the stop time.

Remote Command:	[:SENSe]RECOrding:PLAYback:LOOP OFF ON 0 1 [:SENSe]RECOrding:PLAYback:LOOP?
Example:	REC:PLAY:LOOP ON
Preset:	ON
State Saved:	No
Range:	Off On
Key Path:	Sweep/Control, Playback
Instrument S/W Revision:	A.01.60 or later

Querying Recording Information

Various information about the recording is saved with the recording and can be queried remotely:

- Measurement center frequency when recording was made
- Span setting when recording was made
- Span of the recording (may be larger than the measurement span setting)
- Sample rate of recording
- Time length of recording

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- Whether recording is complex or real

Remote Command: [:SENSe]:RECORDing:PLAYback:FREQuency:CENTer?

Remote Command Notes: Query Only

Returns the center frequency at which the recording was made

Instrument S/W Revision: A.01.60 or later

Remote Command: [:SENSe]:RECORDing:PLAYback:FREQuency:SPAN?

Remote Command Notes: Query Only

Returns the span setting when the recording was initiated. The actual recording span may be greater.

Instrument S/W Revision: A.01.60 or later

Remote Command: [:SENSe]:RECORDing:PLAYback:FREQuency:SPAN:MAX?

Remote Command Notes: Query Only

Returns the actual span at which the recording was made. The actual recording span may be greater than the span that was displayed when the recording was initiated.

Instrument S/W Revision: A.01.60 or later

Remote Command: [:SENSe]:RECORDing:PLAYback:LENGth?

Remote Command Notes: Query Only

Returns the length (in seconds) of the recording.

Instrument S/W Revision: A.01.60 or later

Remote Command: [:SENSe]:RECORDing:PLAYback:SRATe?

Remote Command Notes: Query Only

Returns the sample rate (in Hz) of the data in the recording.

Instrument S/W Revision: A.01.60 or later

Remote Command:	[:SENSe] :RECOrding:PLAYback:ZOOM?
Remote Command Notes:	Query Only Always returns 1 currently (0 means data is real, 1 means it is complex)
Instrument S/W Revision:	A.01.60 or later

Gate

The Gate key in the Sweep/Control menu accesses a menu that enables you to control the gating function.

The Gate functionality is used to view signals best viewed by qualifying them with other events. Gate setup parameters are meas global, so the settings will be the same in all the measurements.

Sweep Time autocoupling rules and annotation are changed by Gate being on.

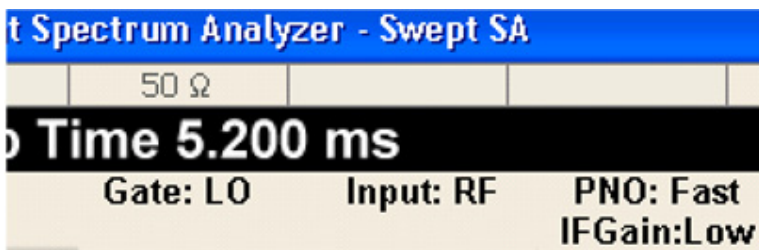
Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Gate On/Off

Turns the gate function on and off.

When the Gate Function is on, the selected Gate Method is used along with the gate settings and the signal at the gate source to control the sweep and video system with the gate signal. Not all measurements allow every type of Gate Methods.

When Gate is on, the annunciation in the Meas Bar reflects that it is on and what method is used, as seen in the "Gate: LO" annunciator below.



Remote Command:	[:SENSe] :SWEep:EGATe [:STATe] OFF ON 0 1 [:SENSe] :SWEep:EGATe [:STATe] ?
Example:	SWE:EGAT ON SWE:EGAT ?

Sweep / Control

Dependencies/Couplings: The function is unavailable (grayed out) and Off when:

- Gate Method is LO or Video and FFT Sweep Type is manually selected.
- Gate Method is FFT and Swept Sweep Type is manually selected.
- Marker Count is ON.

When Meas Method is RBW or FAST, this function is unavailable and the key is grayed out.

Whenever Gate is on, Meas Method, RBW or FAST is unavailable and keys for those are grayed out.

When Gate is on, Offset Res BW and Offset Video BW is ignored (if user sets these values) and measurement works like as all Offset Res BW and all Offset Video BW are coupled with Res BW and Video BW under BW menu. When Gate is on, Offset BW key in Offset/Limit menu is grayed out.

Preset: Off

Range: On|Off

State Saved: Saved in State

Key Path: Sweep/Control, Gate

Instrument S/W Revision: A.01.60 or later

Gate View On/Off

Turning on Gate View in the Swept SA measurement provides a single-window gate view display.

Turning on Gate View in other measurements shows the split-screen Gate View. In these measurements, when the Gate View is on, the regular view of the current measurement traces and results are reduced vertically to about 70% of the regular height. The Zero Span window showing the positions of the Gate is shown between the Measurement Bar and the reduced measurement window. By reducing the height of the measurement window, some of the annotation on the Data Display may not fit and is not shown.

Key Path Sweep/Control, Gate

Remote Command [:SENSe]:SWEp:EGATe:VIEW ON|OFF|1|0
[:SENSe]:SWEp:EGATe:VIEW?

Example SWE:EGAT:VIEW ON turns on the gate view.

Dependencies/Couplings

These couplings apply to the Swept SA measurement:

- When Gate View is turned on, the instrument is set to Zero Span.
- Gate View automatically turns off whenever a Span other than Zero is selected.
- Gate View automatically turns off if you presses Last Span while in Gate View, and the instrument returns to the Span it was in before entering Gate View (even if that is Zero Span).

When Gate View is turned on, the sweep time used is the gate view sweep time. This is set according to the rules in “[Gate View Sweep Time](#)” on page 918.

- When Gate View is turned off, Sweep Time is set to the normal Swept SA measurement sweep time.
- If Gate View is on and Gate is off, then turning on Gate turns off Gate View.

In the Swept SA measurement:

In Gate View, the regular Sweep Time key is grayed out, to avoid confusing you who wants to set Gate View Sweep Time.

In the other measurements:

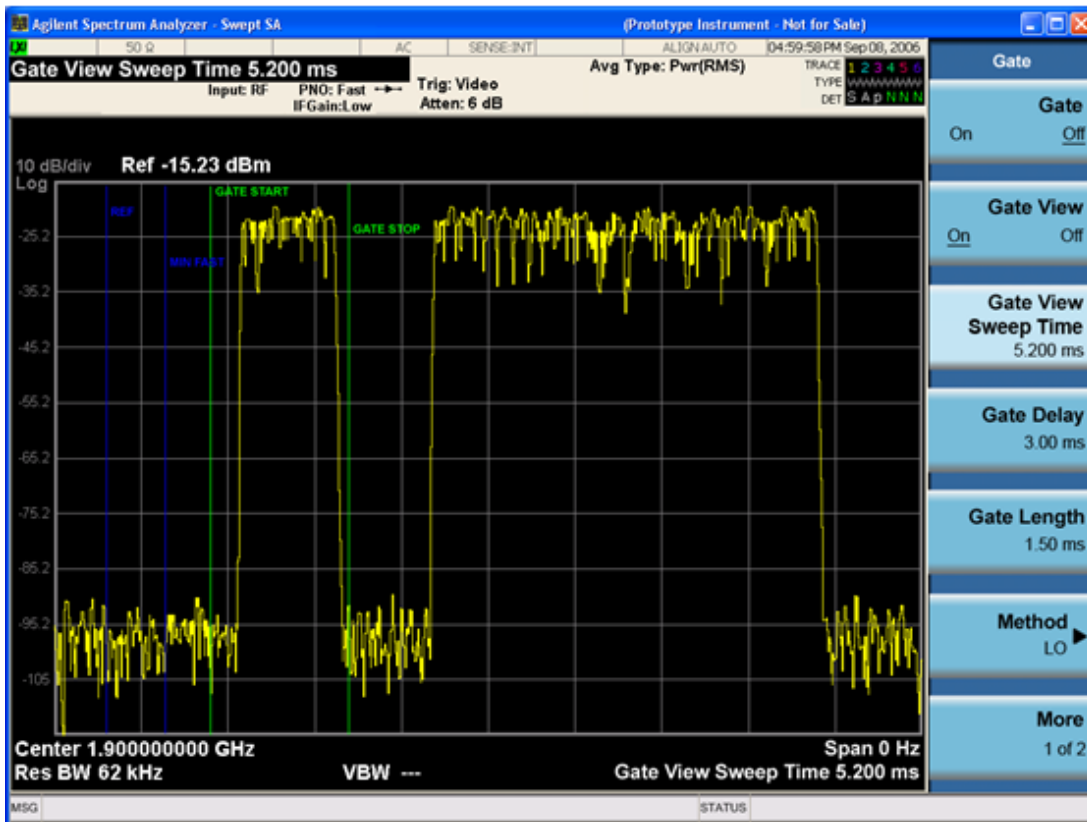
When you turn Gate View on, the lower window takes on the current state of the instrument. Upon leaving Gate View, the instrument takes on the state of the lower window.

- When you turn Gate View on, the upper window Sweep Time is set to the gate view sweep time.

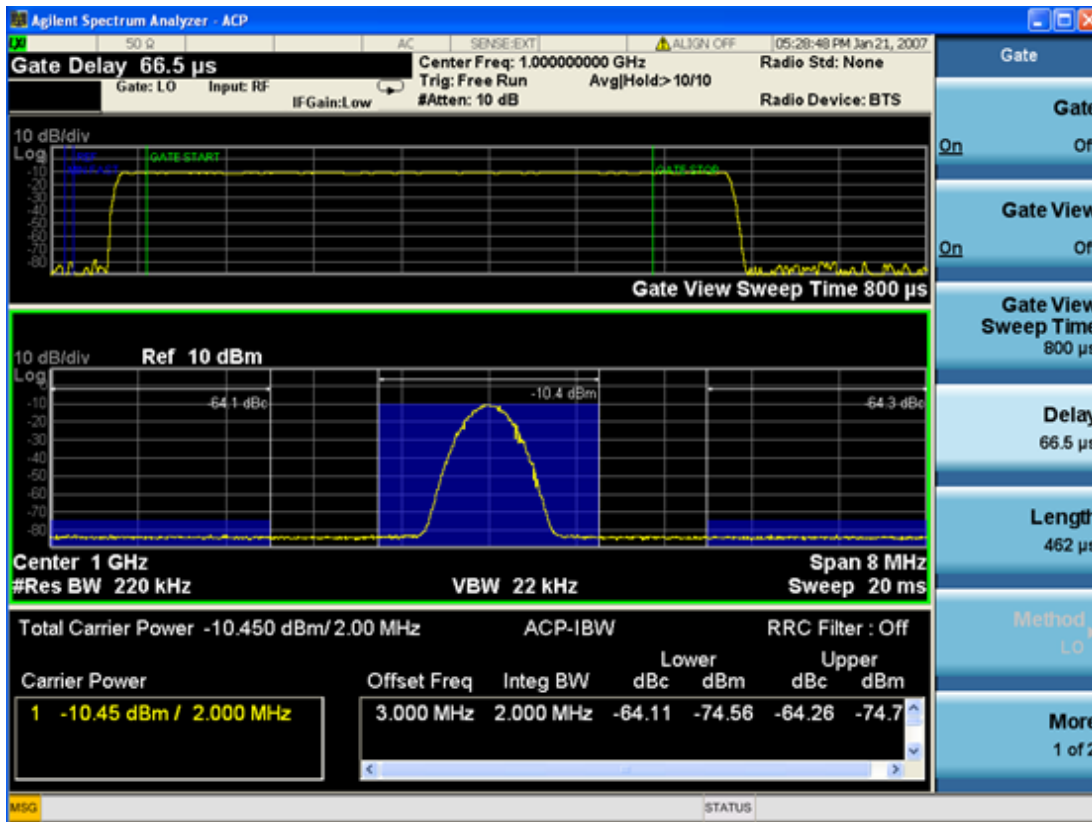
Preset	OFF
State Saved	Saved in state
Range	On Off
Instrument S/W Revision	A.01.60 or later

A sample of the Gate View screen in the Swept SA measurement is shown below:

Sweep / Control



A sample of the Gate View screen in other measurements is shown below. This example is for the ACP measurement:



Turning Gate View off returns the analyzer to the Normal measurement view.

In the Swept SA, the normal measurement view is the single-window Swept SA view. When returning to this view, the Swept SA measurement returns to the Span it was in before entering **Gate View** (even if that is Zero Span).

The **Gate View** window is triggered from the Gate Source, with zero trigger delay. Also, when updating the **Gate View** window, the Gate itself must not operate. So it is internally shut off while the gate view window is being updated. For the Swept SA measurement, this means that the Gate is internally shut off whenever the gate view window is displayed. The Meas Bar and keys continue to show the Trigger source for the main sweep window and give no indication that the Gate is shut off or that the Gate View window is triggered from the Gate Source.

When in **Gate View**, vertical lines are displayed in the Gate View window as follows:

- Green lines are displayed at the gate edges as follows: in Edge Gate, a line is shown for Delay and one for the end of the Gate period (defined by Length, even in FFT. In Level Gate a line is shown only for Delay. You can adjust the position of the green lines by adjusting the gate length and the gate delay. These lines update in the Gate View window as the active function changes, even if the window is not being updated. In Gated LO and Gated Video, these lines are positioned relative to the delay reference line (not relative to 0 time). In Gated FFT, their location is relative to the left edge of the screen.
- A blue line is displayed showing the delay reference, that is, the reference point for the Gate Delay within the Zero Span window. The blue line represents where (in time) the effective location of the gate start would be if the gate were programmed to zero delay.

Sweep / Control

- The second blue line is labeled "MIN FAST" as shown in the figure above because it represents the minimum Gate Delay for fast Gated LO operation. This line is only displayed in Gated LO. You cannot scroll (knob) or decrement (down key) the Gate Delay to less than that represented by the position of this line, it can only be set below this position manually, although once there it can be moved freely with the knob while below the line.
- A yellow line in the Gated Video case only, is displayed at Blength, where Blength is the bucket length for the swept trace, which is given by the sweep time for that trace divided by number of Points – 1. So it is referenced to 0 time, not to the delay reference. This line is labeled NEXT PT (it is not shown in the figure above because the figure above is for Gated LO). The yellow line represents the edge of a display point (bucket). Normally in Gated Video, the bucket length must be selected so that it exceeds the off time of the burst. There is another way to use the analyzer in Gated Video measurements, and that is to set the bucket width much shorter than the off time of the burst. Then use the Max Hold trace function to fill in "missing" buckets more slowly. This allows you to see some of the patterns of the Gated Video results earlier, though seeing a completely filled-in spectrum later.

Gate View Sweep Time

Controls the sweep time in the Gate View window. In order to provide an optimal view of the gate signal, the analyzer initializes Gate View Sweep Time based on the current settings of Gate Delay and Gate Length.

Remote Command: [:SENSe]:SWEep:EGATe:TIME <time>
 [:SENSe]:SWEep:EGATe:TIME?

Example: SWE:EGAT:TIME 500 ms

Dependencies/Couplings:

Gate View Sweep Time is initialized:

- on Preset (after initializing delay and length).

- every time the Gate Method is set/changed.

Additionally, in the Swept SA measurement, whenever you do a Preset, or leave Gate View, the analyzer remembers the Gate Delay and Gate Length settings. Then, when returning to Gate View, if the current Gate Delay and/or Gate Length do not match the remembered values Gate View Sweep Time is re-initialized.

1. Compute the location of the "gate stop" line, which you know is at time $t = t_{min} + \text{GateDelay} + \text{GateLength}$.

Preset:	519.3 μs WiMAX OFDMA: 5 ms GSM/EDGE: 1 ms
State Saved:	Saved in state
Min:	1 μs
Max:	6000 s
Key Path:	Sweep/Control, Gate
Instrument S/W Revision:	A.01.60 or later

Gate Delay

Controls the length of time from the time the gate condition goes True until the gate is turned on.

Remote Command: [:SENSe] :SWEep:EGATe:DELAy <time>
[:SENSe] :SWEep:EGATe:DELAy?

Example: SWE:EGAT:DELAy 500ms
SWE:EGAT:DELAy?

Sweep / Control

Remote Command Notes:	Units of time are required or no units; otherwise an invalid suffix error will be generated. See error –131.
Preset:	57.7 us WiMAX OFDMA: 71 us GSM/EDGE: 600 us
State Saved:	Saved in state
Min:	0.0 us
Max:	100 s
Key Path:	Sweep/Control, Gate
Instrument S/W Revision:	A.01.60 or later

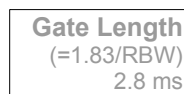
Gate Length

Controls the length of time that the gate is on after it opens.

Remote Command: [:SENSE]:SWEep:EGATe:LENGth <time>
[:SENSE]:SWEep:EGATe:LENGth?

Example: SWE:EGAT:LENG 1
SWE:EGAT:LENG?

Dependencies/Couplings: Grayed out when Gate Method is set to FFT in which case the label changes to that shown below.



Gate Length
(=1.83/RBW)
2.8 ms

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The key is also grayed out if Gate Control = Level.

Remote Command Notes:	Units of time are required or no units; otherwise an invalid suffix will be generated.
Preset:	461.6 us WiMAX OFDMA: 50 us GSM/EDGE: 200 us
State Saved:	Saved in state
Min:	100 ns
Max:	5 s
Key Path:	Sweep/Control, Gate

Instrument S/W Revision: A.01.60 or later

Method

This lets you choose one of the three different types of gating.

Not all types of gating are available for all measurements.

Remote Command: [:SENSe] :SWEep:EGATe:METhod LO|VIDeo|FFT
[:SENSe] :SWEep:EGATe:METhod?

Example: SWE:EGAT:METh FFT

Preset: LO

State Saved: Saved in state

Key Path: Sweep/Control, Gate

Instrument S/W Revision: A.01.60 or later

LO When set to Gate (On), the LO sweeps whenever the gate conditions as specified in the Gate menu are satisfied by the signal at the Gate Source.

This form of gating is more sophisticated, and results in faster measurements. With Gated LO, the analyzer only sweeps while the gate conditions are satisfied. This means that a sweep could take place over several gate events. It would start when the gate signal goes true and stop when it goes false, then continue when it goes true again. But since the LO is sweeping as long as the gate conditions are satisfied, the sweep typically finishes much more quickly than with Gated Video.

When in zero span, there is no actual sweep performed. But data is only taken while the gate conditions are satisfied. So even though there is no sweep, the gate settings will impact when data is acquired.

Dependencies/Couplings: Key is unavailable when Gate is On and FFT Sweep Type manually selected.
When selected, Sweep Type is forced to Swept and the FFT key in Sweep Type is grayed out.

Key Path: Sweep/Control, Gate, Method

Instrument S/W Revision: A.01.60 or later

Video When set to Gate (On), the video signal is allowed to pass through whenever the gate conditions as specified in the Gate menu are satisfied by the signal at the Gate Source.

This form of gating may be thought of as a simple switch, which connects the signal to the input of the spectrum analyzer. When the gate conditions are satisfied, the switch is closed, and when the gate conditions are not satisfied, the switch is open. So we only look at the signal while the gate conditions are satisfied.

With this type of gating, you usually set the analyzer to sweep very slowly. In fact, a general rule is to sweep slowly enough that the gate is guaranteed to be closed at least once per bucket (data measurement

Sweep / Control

interval). Then if the peak detector is used, each bucket will represent the peak signal as it looks with the gate closed.

Dependencies/Couplings:	Key is unavailable when Gate is On and FFT Sweep Type manually selected. When selected, Sweep Type is forced to Swept and the FFT key in Sweep Type is grayed out
Key Path:	Sweep/Control, Gate, Method
Instrument S/W Revision:	A.01.60 or later

FFT When set to Gate (On), the an FFT is performed whenever the gate conditions as specified in the Gate menu are satisfied by the signal at the Gate Source. This is an FFT measurement which begins when the gate conditions are satisfied. Since the time period of an FFT is approximately $1.83/\text{RBW}$, you get a measurement which starts under predefined conditions and takes place over a predefined period. So, in essence, this is a gated measurement. You have limited control over the gate length but it works in FFT sweeps, which the other two methods do not.

Gated FFT cannot be done in zero span since the instrument is not sweeping. So in zero span the Gated LO method is used. Data is still only taken while the gate conditions are satisfied, so the gate settings do impact when data is acquired.

The Gate Length will be $1.83/\text{RBW}$.

This is a convenient way to make a triggered FFT measurement under control of an external gating signal.

Dependencies/Couplings:	Key is unavailable when Gate is On and Swept Sweep Type manually selected. Key is unavailable when gate Control is set to Level. When selected, Sweep Type is forced to FFT and the Swept key in Sweep Type is grayed out Forces Gate Length to $1.83/\text{RBW}$ (see Length key description above)
Key Path:	Sweep/Control, Gate
Instrument S/W Revision:	A.01.60 or later

Gate Source

The menus under the **Gate Source** key follow the same pattern as those under **Trigger**, with the exception that neither **Free Run** nor **Video** are available as Gate Source selections. Any changes to the settings in the setup menus under each Gate Source selection key (for example: **Trigger Level**) also affect the settings under the Trigger menu keys. Note that the selected Trigger Source does not have to

match the Gate Source.

Remote Command:	<code>[:SENSe] :SWEep:EGATe:SOURce EXTernal1 EXTernal2 LINE FRAMe RFBurst TV [:SENSe] :SWEep:EGATe:SOURce?</code>
Preset:	EXTernal 1 GSM/EDGE: FRAMe
Key Path:	Sweep/Control, Gate
Dependencies/Couplings:	TV triggering is not available yet.
Instrument S/W Revision:	A.01.60 or later

Control Edge/Level

Sets the method of controlling the gating function from the gating signal.

Edge

In Edge triggering, the gate opens (after the Delay) on the selected edge (for example, positive) of the gate signal and closes on the alternate edge (for example, negative).

Level

In Level triggering, the gate opens (after the Delay) when the gate signal has achieved a certain level and stays open as long as that level is maintained.

Remote Command:	<code>[:SENSe] :SWEep:EGATe:CONTRol EDGE LEVel [:SENSe] :SWEep:EGATe:CONTRol?</code>
Example:	SWE:EGAT:CONT EDGE
Dependencies/Couplings:	If the Gate Method is FFT the Control key is grayed out and Edge is selected. If the Gate Source is TV, Frame or Line, the Control key is grayed out and Edge is selected.
Preset:	EDGE
State Saved:	Saved in stat
Key Path:	Sweep/Control, Gate
Instrument S/W Revision:	A.01.60 or later

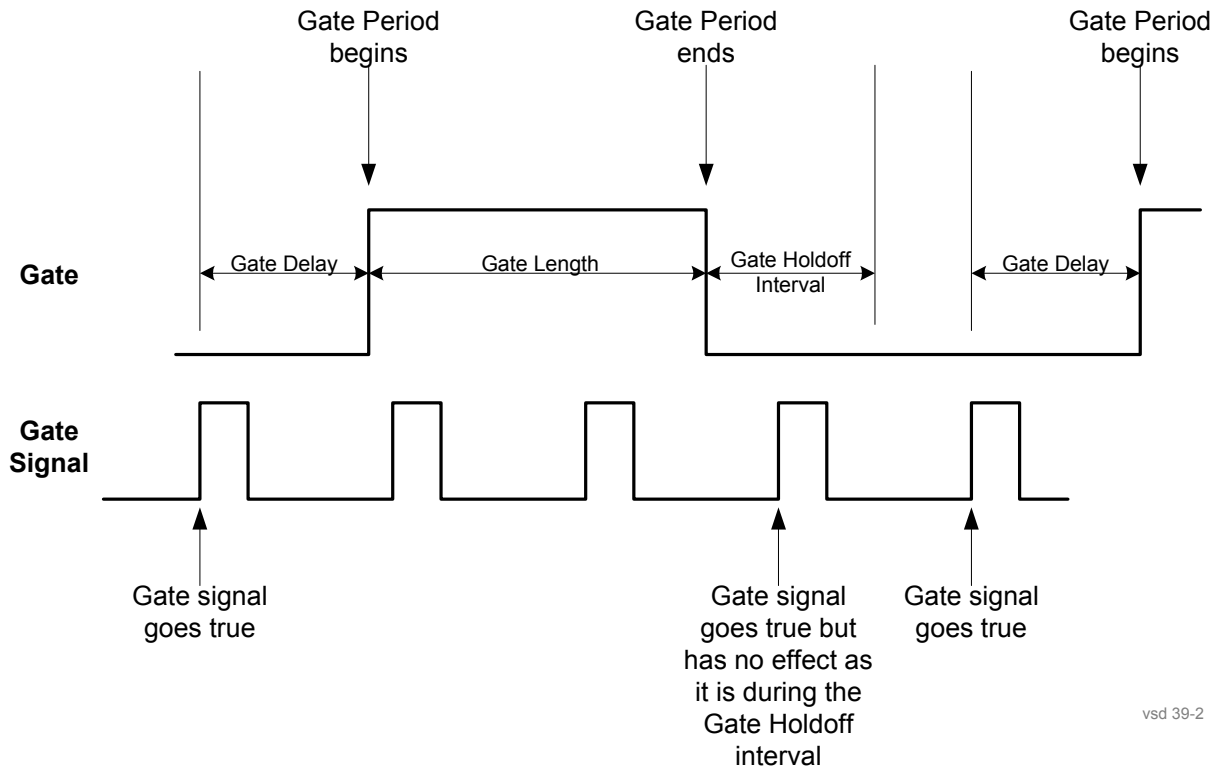
Gate Holdoff

Lets you increase or decrease the wait time after a gate event ends before the analyzer will respond to the next gate signal.

After any Gate event finishes, the analyzer must wait for the sweep system to settle before it can respond to another Gate signal. The analyzer calculates a "wait time," taking into account a number of factors,

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including RBW and Phase Noise Optimization setting. The goal is to achieve the same accuracy when gated as in ungated operation. The figure below illustrates this concept:



When Gate Holdoff is in Auto, the wait time calculated by the analyzer is used. When Gate Time is in Manual, you may adjust the wait time, usually decreasing it in order to achieve greater speed, but at the risk of decreasing accuracy.

When **Method** is set to **Video** or **FFT**, the **Gate Holdoff** function has no effect.

In measurements that do not support Auto, the value shown when Auto is selected is "---" and ??? is returned to a query.

Remote Command

```
[ :SENSe ] :SWEp:EGATe:HOLDoff <time>
[ :SENSe ] :SWEp:EGATe:HOLDoff?
[ :SENSe ] :SWEp:EGATe:HOLDoff:AUTO OFF|ON|0|1
[ :SENSe ] :SWEp:EGATe:HOLDoff:AUTO?
```

Dependencies/Couplings	<p>When Gate Holdoff is Auto, the Gate Holdoff key shows the value calculated by the analyzer for the wait time.</p> <p>Pressing the Gate Holdoff key while it is in Auto and not selected, causes the key to become selected and allows you to adjust the value. If the value is adjusted, the setting changes to Man.</p> <p>Pressing the Gate Holdoff key, while it is in Auto and selected, does not change the value of Gate Holdoff, but causes the setting to change to Man. Now you can adjust the value.</p> <p>Pressing the key while it is in Man and selected, cause the value to change back to Auto.</p> <p>Pressing the key while it is in Man and not selected, causes the key to become selected and allows you to adjust the value.</p> <p>When Method is set to Video or FFT, the Gate Holdoff function has no effect.</p> <p>See Coupling, above</p>
Example	<pre>SWE:EGAT:HOLD 0.0002 SWE:EGAT:HOLD? SWE:EGAT:HOLD:AUTO ON SWE:EGAT:HOLD:AUTO?</pre>
Instrument S/W Revision	A.01.60 or later
Key Path	Sweep/Control, Gate
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Preset	Auto Auto/On
State Saved	Saved in instrument state.
Min	1 μsec
Max	1 sec

Gate Delay Compensation

This function allows you to select an RBW-dependent value by which to adjust the gate delay, to compensate for changes in the delay caused by RBW effects. The intent is to make it unnecessary for you to worry about the effects that RBW will have on the gate circuitry, by automatically compensating for them.

You can select between uncompensated operation and two types of compensation, **Delay Until RBW Settled** and **Compensate for RBW Group Delay**.

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See “More Information” on page 926

Remote Command:	<code>[:SENSe] :SWEep:EGATe:DELaY:COMPensation:TYPE</code> <code>OFF SETTled GDELaY</code> <code>[:SENSe] :SWEep:EGATe:DELaY:COMPensation:TYPE?</code>
Example:	<code>SWE:EGAT:DEL:COMP:TYPE SETT</code> <code>SWE:EGAT:DEL:COMP:TYPE?</code>
Scope:	Meas Global
Range:	Uncompensated Delay Until RBW Settled Compensate for RBW Group Delay
Preset:	TD-SCDMA mode: Compensate for RBW Group Delay All other modes: Delay Until RBW Settled
State Saved:	Saved in state
Key Path:	Sweep/Control, Gate
Notes:	Although this function is Meas Global, there are some measurements that do not support this function. In those measurements the operation will be Uncompensated. Going into one of those measurements will not change the Meas Global selection; it will simply display the grayed-out menu key with “Uncompensated” showing as the selection, the SCPI command is still accepted. If Gate Delay Compensation is not supported at all within a particular mode, the key is not displayed, and if the SCPI command is sent while in a measurement within that mode, an “Undefined Header” error is generated. Measurements that do not support this function include: Swept SA
Instrument S/W Revision:	A.01.60 or later

More Information

Selecting **Uncompensated** means that the actual gate delay is as you sets it.

Selecting **Delay Until RBW Settled** causes the gate delay to be increased above you setting by an amount equal to $3.06/\text{RBW}$. This compensated delay causes the GATE START and GATE STOP lines on the display to move by the compensation amount, and the actual hardware gate delay to be increased by the same amount. All the other gate lines (fro example, MIN FAST) are unaffected. If the RBW subsequently changes, the compensation is readjusted for the new RBW. The value shown on the **Gate Delay** key does NOT change.

Delay Until RBW Settled allows excellent measurements of gated signals, by allowing the IF to settle following any transient that affects the burst. Excellent measurements also require that the analysis region not extend into the region affected by the falling edge of the burst. Thus, excellent measurements can only be made over a width that declines with narrowing RBWs. Therefore, for general purpose compensation, you will still want to change the gate length with changes in RBW even if the gate delay is compensated.

Selecting **Compensate for RBW Group Delay** causes the gate delay to be increased above you setting by an amount equal to $1.81/\text{RBW}$. This compensated delay causes the GATE START, GATE STOP lines on the display to move by the compensation amount, and the actual hardware gate delay to be increased by the same amount. All the other gate lines (for example, MIN FAST) are unaffected. If the RBW subsequently changes, the compensation is readjusted for the new RBW. The value shown on the **Gate Delay** key does NOT change. **Compensate for RBW Group Delay** also includes gate length compensation; the gate length itself is adjusted as necessary to attempt to compensate for delay effects imposed by the RBW.

Compensate for RBW Group Delay is similar to **Delay Until RBW Settled**, but compensates for the group delay of the RBW filter, rather than the filter settling time. As the RBW gets narrow, this can allow the settling tail of the RBW to affect the beginning part of the gated measurement, and allow the beginning of the RBW settling transient to affect the end of the gated measurement. These two effects are symmetric because the RBW response is symmetric. Because the gate length is not automatically compensated, some users might find this compensation to be more intuitive than compensation for RBW settling.

Min Fast Position Query (Remote Command Only)

This command queries the position of the MIN FAST line, relative to the delay reference (REF) line. See section “[Gate View On/Off](#)” on page 914. If this query is sent while not in gate view, the MinFast calculation is performed based on the current values of the appropriate parameters and the result is returned. Knowing this value lets you to set an optimal gate delay value for the current measurement setup.

Remote Command: [:SENSe] :SWEp:EGATe:MINFast?

Example: SWE:EGAT:MIN?

Instrument S/W Revision: A.01.60 or later

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