

Agilent X-Series Signal Analyzer

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

MXA Signal Analyzer N9020A

EXA Signal Analyzer N9010A

**N6149A iDEN/WiDEN/
MotoTalk Analyzer
Measurement Application
User's and Programmer's
Reference**



Agilent Technologies

Notices

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| [[:SENSe]:CORRection:CSET[1] 2 3 4:COMMeNt "text" | 539 |
| [[:SENSe]:CORRection:CSET[1] 2 3 4:COMMeNt? | 539 |
| [[:SENSe]:CORRection:CSET[1] 2 3 4:DATA <freq>, <amp>, | 542 |
| [[:SENSe]:CORRection:CSET[1] 2 3 4:DATA:MERGe <freq>, <amp>,... | 543 |
| [[:SENSe]:CORRection:CSET[1] 2 3 4:DATA? | 542 |
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| [[:SENSe]:CORRection:IQ:I:GAIN? | 528 |
| [[:SENSe]:CORRection:IQ:I:Q:ATTenuation <rel_amp> | 520 |
| [[:SENSe]:CORRection:IQ:I:Q:ATTenuation:RATio <real> | 520 |
| [[:SENSe]:CORRection:IQ:I:Q:ATTenuation:RATio? | 520 |
| [[:SENSe]:CORRection:IQ:I:Q:ATTenuation? | 520 |
| [[:SENSe]:CORRection:IQ:Q:GAIN <rel_amp> | 529 |
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| [[:SENSe]:FREQuency:CENTer:STEP:AUTO? | 761 |
| [[:SENSe]:FREQuency:CENTer:STEP[:INCRement] <freq> | 761 |
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| [:SENSe]:IDEMod:ADRoop:COMPensation? | 412 |
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| [[:SENSe]:MONitor:AVERage[:STATe] OFF ON 0 1 | 316 |
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| [::SENSe]:MONitor:FREQuency:SPAN:BANDwidth[:RESolution]:RATio:AUTO? | 301 |
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| [:SENSe]:ROSCillator:SOURce INTernal EXTernal | 544 |
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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 79](#).

See [“Navigating the Help Window Without a Mouse” on page 84](#) 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 93](#).

See [“Navigating the Help Window with a Mouse” on page 82](#) 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 73](#).

To locate **Other Available Help Resources**, see [“Locating Other Help Resources” on page 72](#).

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 88.

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 |

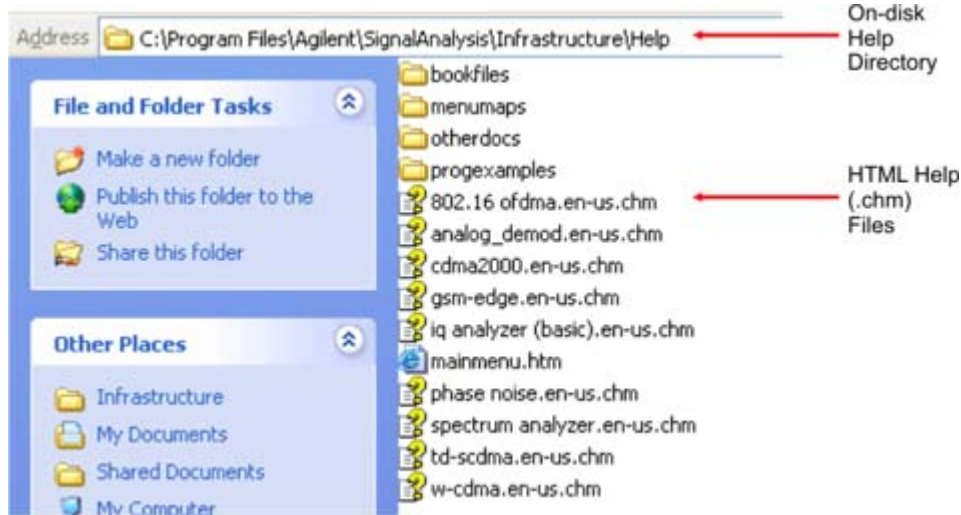
Copying the HTML Help (CHM) Files

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.



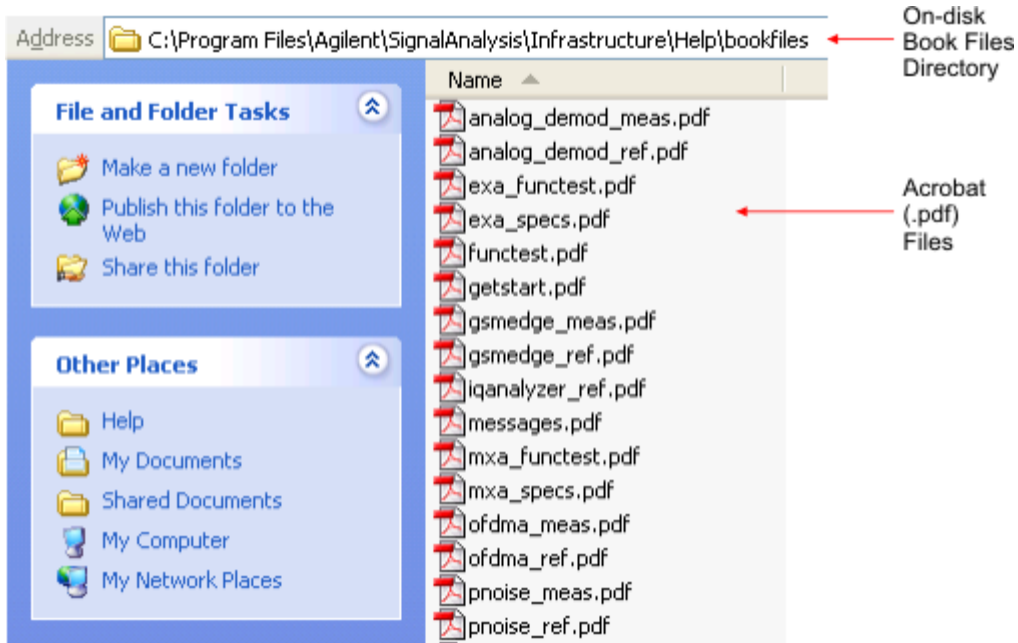
NOTE You can open and view the HTML Help files only on a PC that has Microsoft Windows and Microsoft Internet Explorer installed.

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](#)

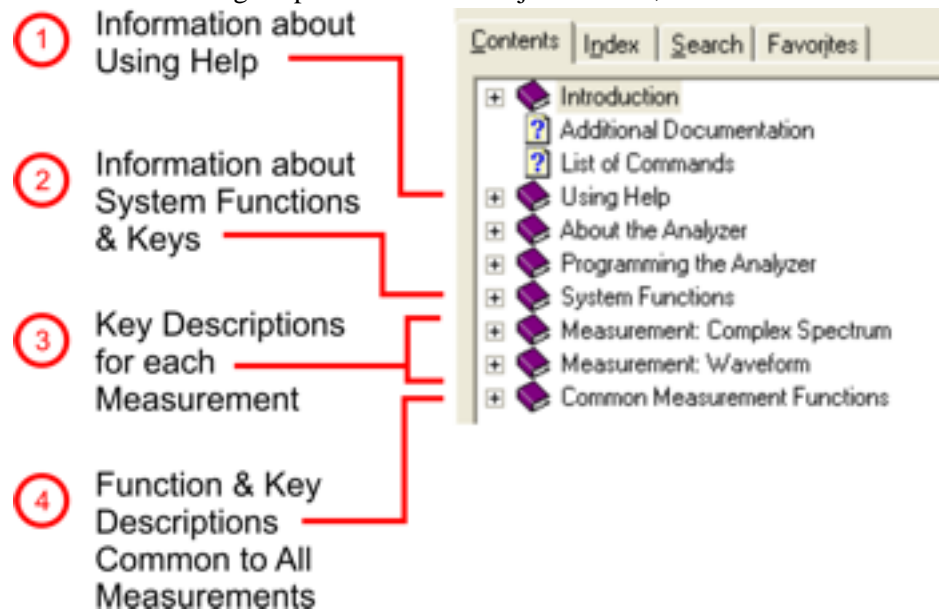
[Key Information for Softkeys](#)

[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 76 below.
3. Measurement Functions. See [“Key Descriptions for Each Measurement”](#) on page 77 below.
4. Common Measurement Functions. See [“Common Measurement Functions”](#) on page 78 below.

System Functions

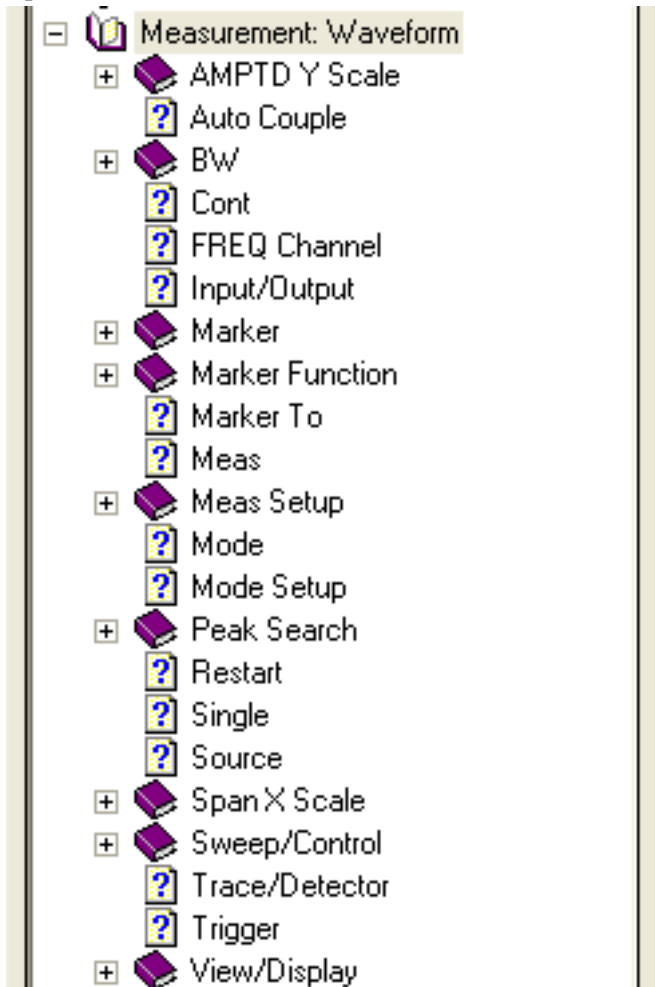
This section contains information for the following keys, which are listed in alphabetical order: **File**, **Preset**, **Print**, **Quick Save**, **Recall**, **Save**, **System**, **User Preset**.

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 78, 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.



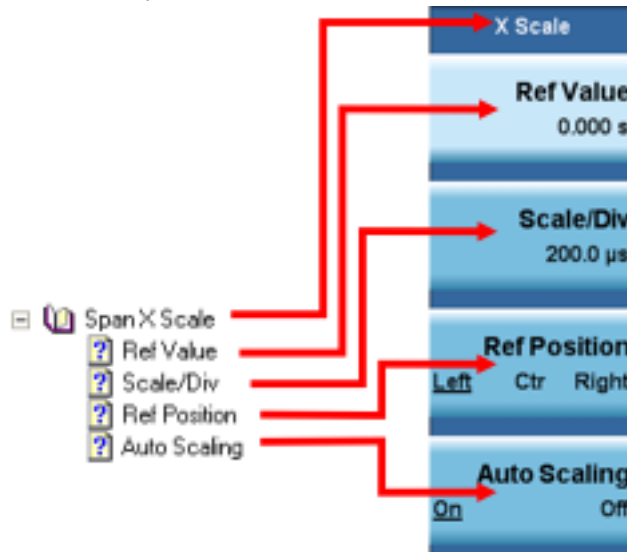
If you don't see a topic for a Front-panel key in the Measurement-specific section, then it is located in the section [System Functions](#).

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

Using Help How Help is Organized

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).

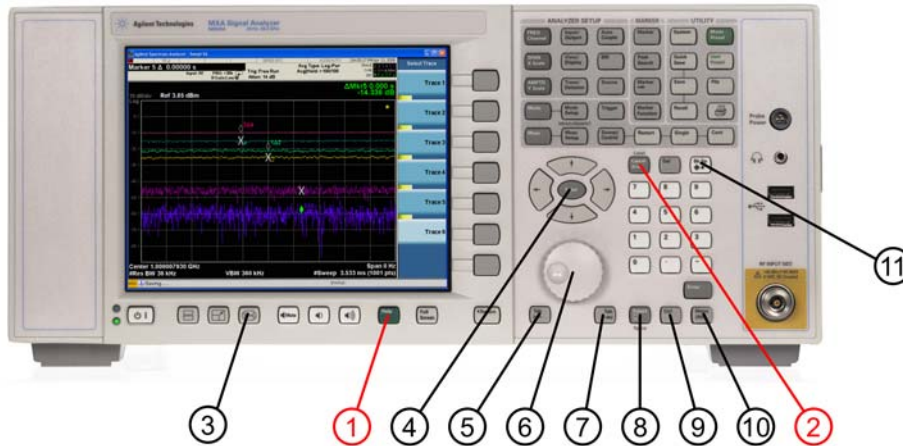
Common Measurement Functions

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.

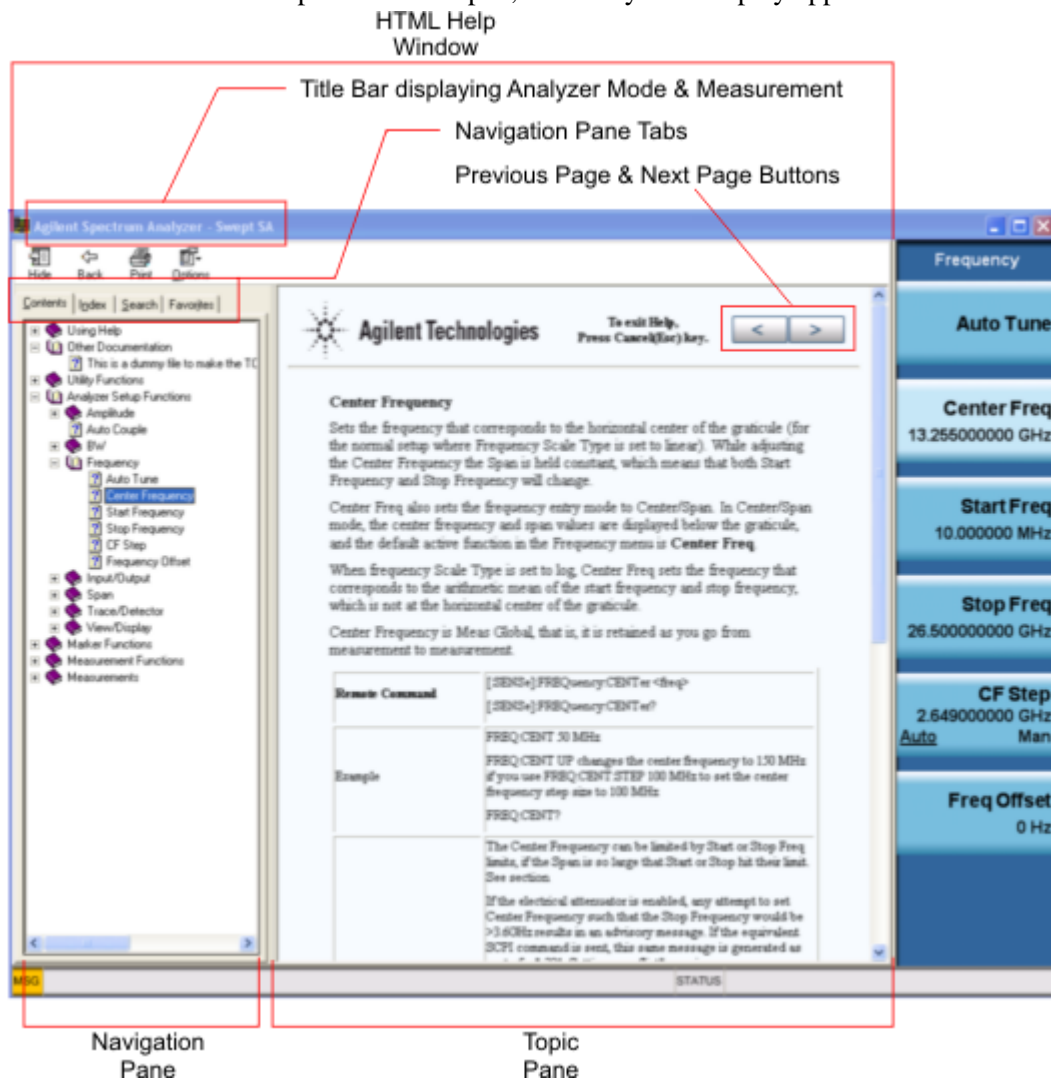


| # | Item Name | Description |
|----|-----------------------|--|
| 1 | Help Key | Opens Help (displaying the topic for the last key pressed). |
| 2 | Cancel (Esc) Key | Exits Help. |
| 3 | Next Window Key | Changes the current window pane selection. Use this key to: TBD. |
| 4 | Arrow / Enter Keys | 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 84.

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 79.

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 82), 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

Using Help

Navigating Windows HTML Help (CHM) Files

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 86 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:

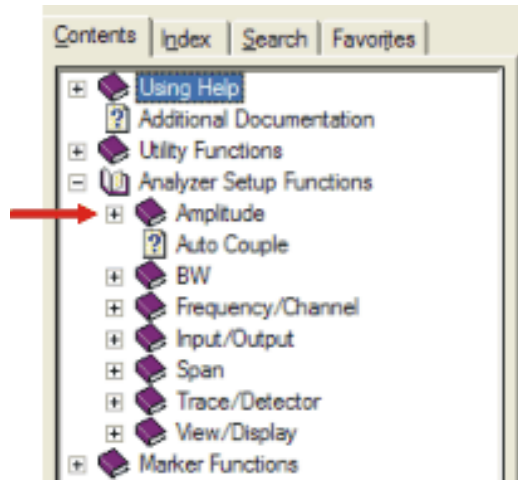
- If you have a mouse and keyboard attached, see the Section [Navigating the Help Window with a Mouse](#).
- If you don't have a mouse and keyboard attached, see the Section [Navigating the Help Window Without a Mouse](#).

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 81, 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.

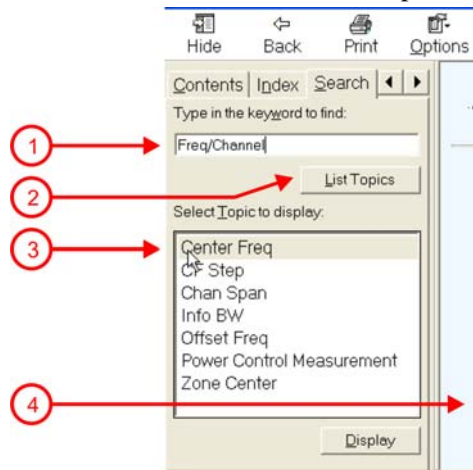


- To move to the Next or Previous Page within the Topic Pane, click the **Next Page** or **Previous Page** Keys (at the top right of the *Topic* Pane), as shown below.



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 87.

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 79.

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



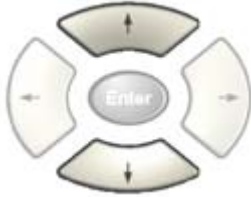
To Switch the Active Tab within the Navigation Pane Perform this procedure to display either the Contents, Index, Search or Favorites tab of the Help window’s Navigation Pane.

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

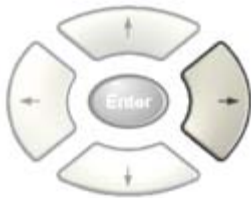


To Scroll up or down the list of Topics within the Contents or Index Tabs of the Navigation Pane

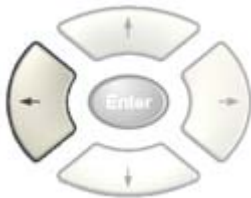
With the focus in the Navigation Pane, press the **Up Arrow** or **Down Arrow** keys.



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.

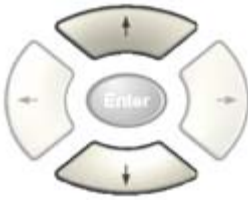


To Display a Help topic in the Topic Pane from the Index Tab of the Navigation Pane With the focus in the Index Tab of the Navigation Pane, press the **Enter** key.



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.



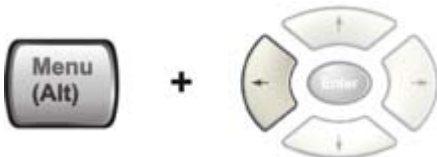
Press **Enter**.



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.

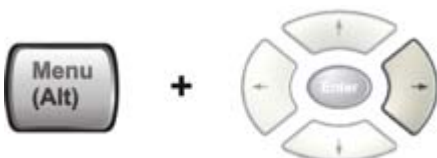


Or:

Press the **Bk Sp** key.

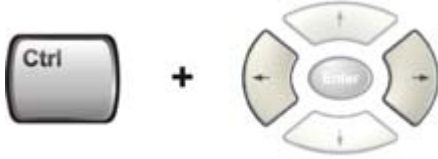


To go *forward*, hold down the **Alt** key, then press the **Right Arrow** key.

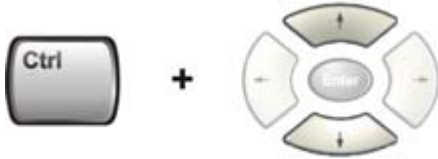


(The "Go Forward" operation has no effect unless there have been previous "Go Back" operations)

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

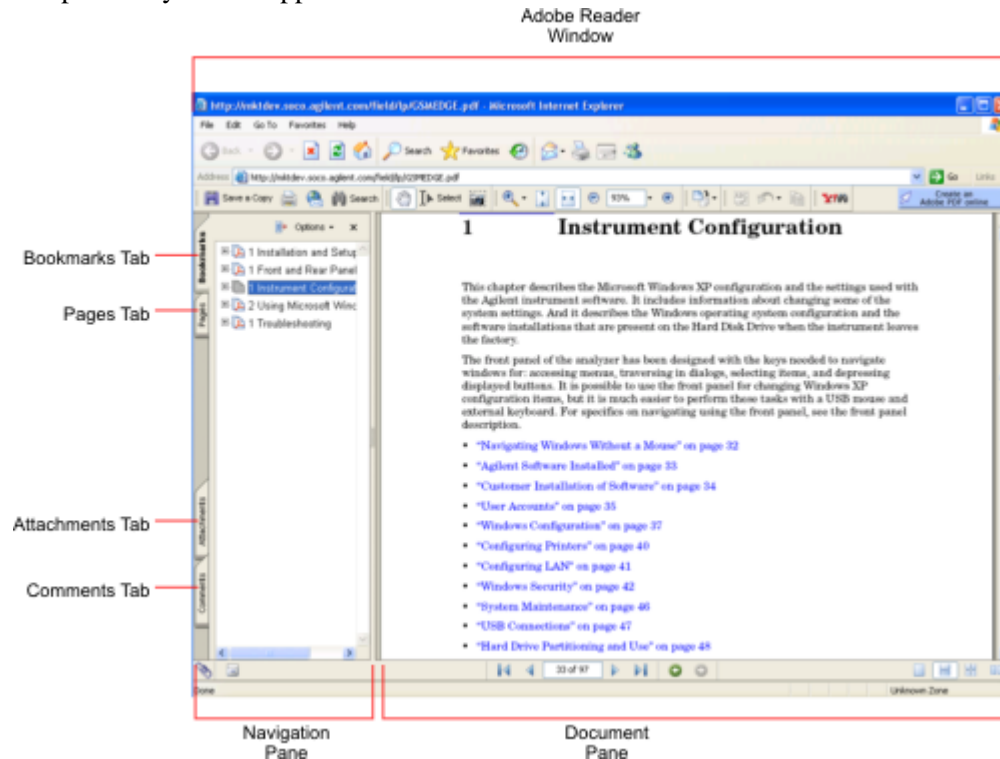
IMPORTANT To navigate PDF files effectively, you must attach a mouse and keyboard to the Analyzer.

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 74](#).

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.

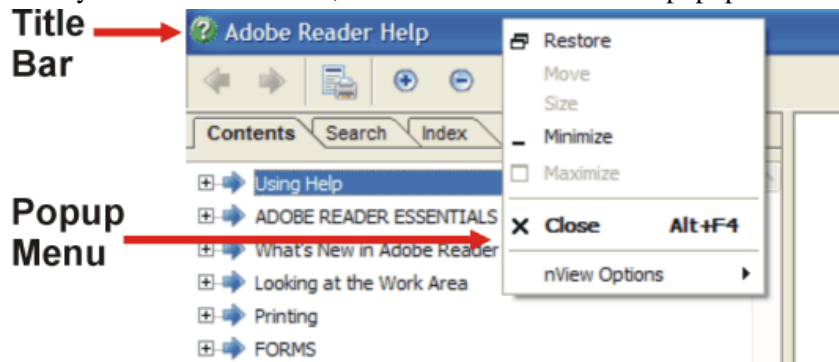
Navigating the Acrobat Reader Window

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.

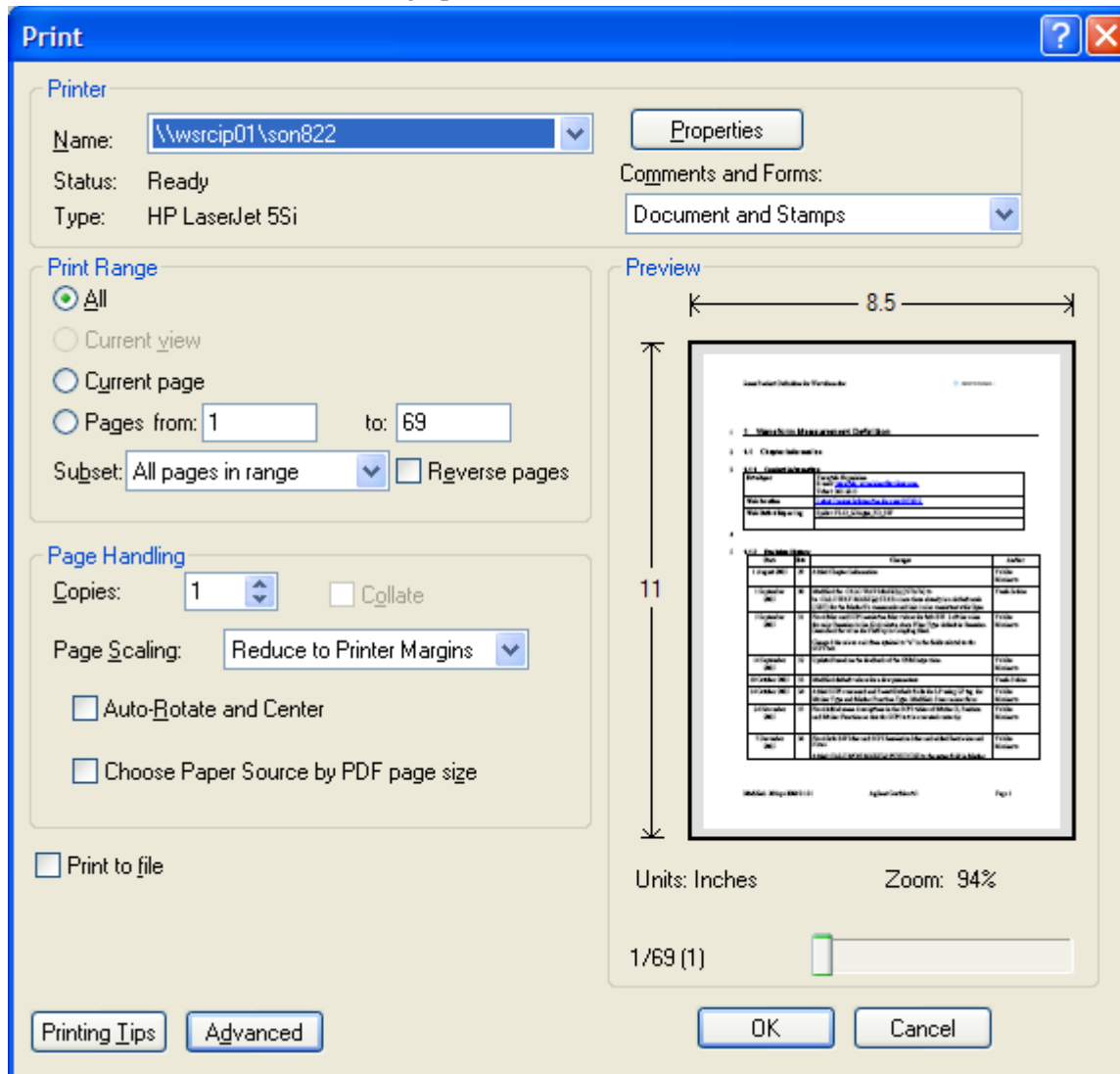
1. *Either*,
 - a. click on the Print icon in the Acrobat Reader toolbar,



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

Using Help
Navigating Acrobat (PDF) Files

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. |
| 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. |

Using Help
Terms Used in This Documentation

| Term | Meaning |
|-----------------------------------|---|
| 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 83](#).
- 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 76](#).





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> |  |

The X-Series signal analyzer measures and monitors complex RF and microwave signals. Analog baseband analysis is available on MXA. The analyzer integrates traditional spectrum measurements with advanced vector signal analysis to optimize speed, accuracy, and dynamic range. The analyzer 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 analyzer is ideal for both R&D and manufacturing engineers working on cellular, emerging wireless communications, general purpose, aerospace and defense applications.

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.

X-Series Options and Accessories

[“MXA Instrument Options” on page 97](#)

[“MXA Accessories” on page 98](#)

[“EXA Instrument Options” on page 98](#)

[“EXA Accessories” on page 99](#)

[“Advanced Measurement Application Software” on page 99](#)

MXA Instrument Options

| Product | Description |
|------------|--|
| N9020A | MXA Signal Analyzer |
| N9020A-503 | Frequency range from 20 Hz to 3.6 GHz |
| N9020A-508 | Frequency range from 20 Hz to 8.4 GHz |
| N9020A-513 | Frequency range from 20 Hz to 13.6 GHz |
| N9020A-526 | Frequency range from 20 Hz to 26.5 GHz |
| N9020A-B25 | Analysis bandwidth, 25 MHz |
| N9020A-BBA | Analog baseband IQ inputs |
| N9020A-PFR | Precision frequency reference |
| N9020A-PRC | Portable configuration |

About the Analyzer
Installing Application Software

| Product | Description |
|----------------|---|
| N9020A-EA3 | Electric attenuator, 3.6 GHz |
| N9020A-S40 | Baseband analysis bandwidth, 40 MHz/channel |
| N9020A-P03 | Preamplifier, 3.6 GHz |
| N9020A-P08 | Preamplifier, 8.4 GHz |
| N9020A-P13 | Preamplifier, 13.6 GHz |
| N9020A-P26 | Preamplifier, 26.5 GHz |

MXA Accessories

| Product | Description |
|----------------|---|
| N9020A-MLP | 75 ohm minimum loss pad |
| N9020A-EFM | USB flash drive |
| N9020A-DVR | DVD-ROM drive |
| N9020A-MSE | Mouse, USB interface |
| N9020A-KYB | Keyboard, USB interface |
| N9020A-HTC | Hard transit case |
| N9020A-1CP | Rackmount kit with handles |
| N9020A-1CN | Front handle kit |
| N9020A-1CM | Rackmount kit |
| N9020A-1CR | Rack slide kit |
| N9020A-CPU | Instrument security, additional CPU and HDD |
| N9020A-UK6 | Commercial Calibration Certificate with Test Data |
| N9020A-1A7 | ISO 17025 Compliant Calibration |
| N9020A-A6J | ANSI Z540 Compliant Calibration |

EXA Instrument Options

| Product | Description |
|----------------|--|
| N9010A | EXA Signal Analyzer (3.6, 7.0, 13.6, and 26.5 GHz) |
| N9010A-503 | Frequency range from 9 kHz to 3.6 GHz |
| N9010A-507 | Frequency range from 9 kHz to 7.0 GHz |
| N9010A-513 | Frequency range from 9 kHz to 13.6 GHz |
| N9010A-526 | Frequency range from 9 kHz to 26.5 GHz |

| Product | Description |
|----------------|-------------------------------|
| N9010A-FSA | Fine step attenuator |
| N9010A-PFR | Precision frequency reference |
| N9010A-PRC | Portable configuration |
| N9010A-EA3 | Electric attenuator, 3.6 GHz |
| N9010A-P03 | Preamplifier, 3.6 GHz |

EXA Accessories

| Product | Description |
|----------------|---|
| N9010A-MLP | Minimum loss pad, 50 to 75 ohms |
| N9010A-EFM | USB flash drive |
| N9010A-DVR | DVD-ROM/CD-R/RW drive |
| N9010A-MSE | Mouse, USB interface |
| N9010A-KYB | Keyboard, USB interface |
| N9010A-HTC | Hard transit case |
| N9010A-1CP | Rackmount kit with handles |
| N9010A-1CN | Front handle kit |
| N9010A-1CM | Rackmount kit |
| N9010A-1CR | Rack slide kit |
| N9010A-CPU | Instrument security, additional CPU and HDD |
| N9010A-UK6 | Commercial Calibration Certificate with Test Data |
| N9010A-1A7 | ISO 17025 Compliant Calibration |
| N9010A-A6J | ANSI Z540 Compliant Calibration |

Advanced Measurement Application Software

For a current list of application software, go to the following URLs.

For MXA,

<http://www.agilent.com/find/mxa/options>

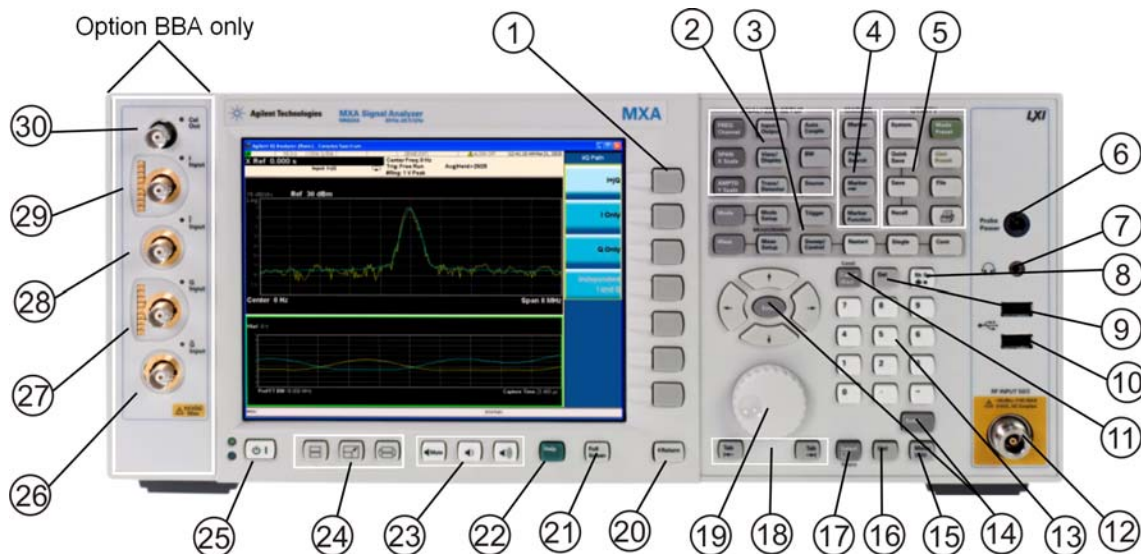
Select the *MXA N9020A, Options and Measurement Applications* link on the top of the page.

For EXA,

<http://www.agilent.com/find/exa/options>

Select the *EXA N9010A, Options and Measurement Applications* link on the top of the page.

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 such as: <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. |

| Item | | Description |
|------|------------------------|--|
| # | Name | |
| 9 | Delete Key | Press this key to delete files, or to perform other deletion tasks. |
| 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. |

About the Analyzer
Front-Panel Features

| Item | | Description |
|------|----------------------|---|
| # | Name | |
| 21 | Full Screen Key | Pressing this key turns off the softkeys to maximize the graticule display area. Press the key again to restore the normal display. |
| 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. <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">NOTE</div> <p>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.</p> <p>The main power cord can be used as the system disconnecting device. It disconnects the mains circuits from the mains supply.</p> |
| 26 | \bar{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 | \bar{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 calibrating the I, \bar{I} , Q and \bar{Q} inputs and probes used with these inputs. ^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. For example, the Auto/Man type of key. To select the function, press the menu key and notice that Auto is underlined and the key becomes 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.

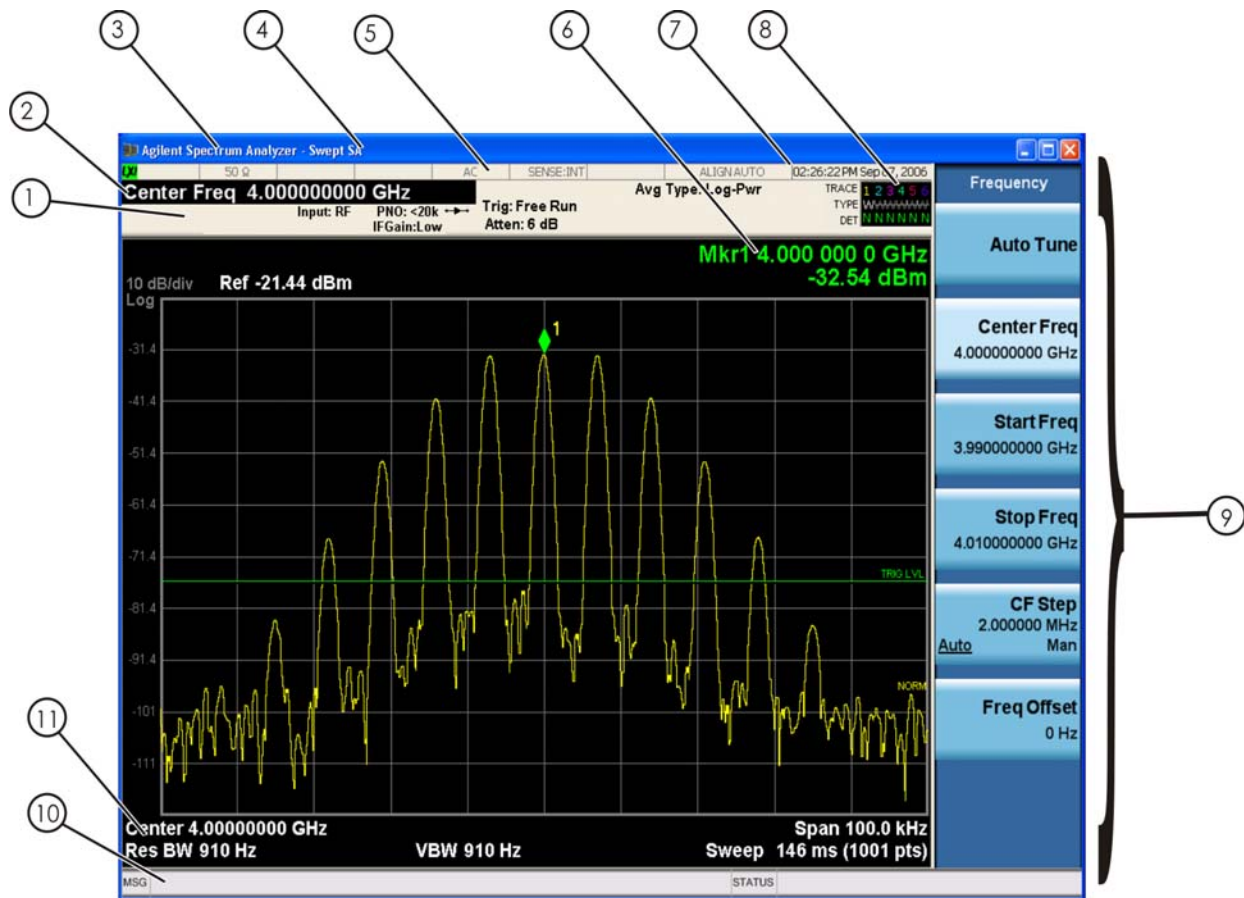
Some of the menu keys are grouped together by a yellow bar running behind the keys near the left side or by a yellow border around the group of keys. When you press a key within the yellow region, such as **Marker Noise**, the highlight moves to that key to show it has been selected. The keys that are 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.

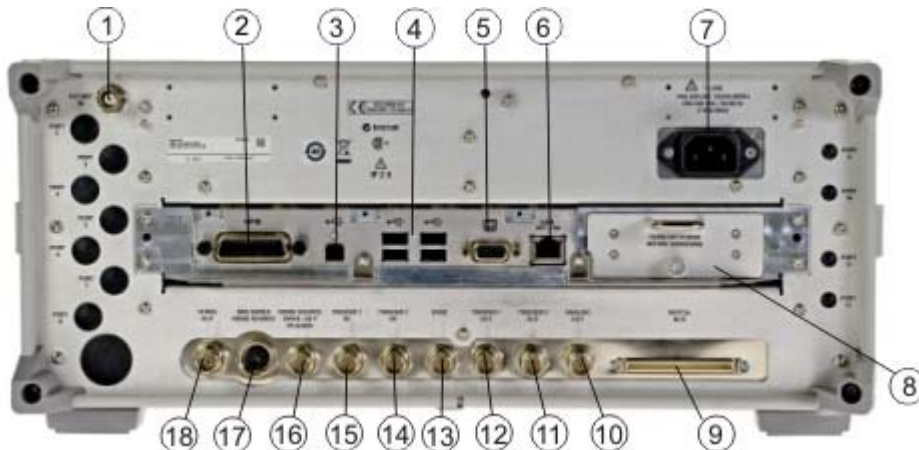


| Item | Description | Function Keys |
|------|--|---|
| 1 | Measurement bar - Shows general measurement settings and information.   Indicates single/continuous measurement. Some measurements include limits that the data is tested against. A Pass/Fail indication may be shown in the lower left of the 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 |

| 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

MXA and EXA with Option PC2



EXA

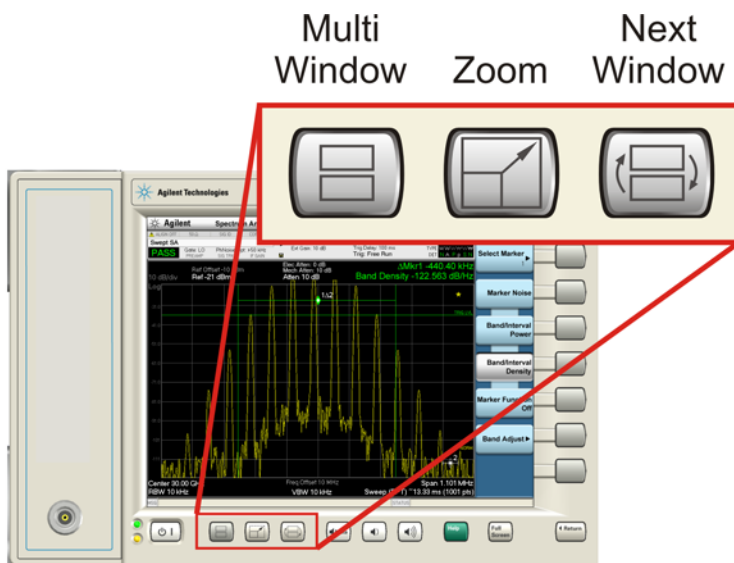


| Item | | Description |
|------|------------|---|
| # | Name | |
| 1 | EXT REF IN | Input for an external frequency reference signal: For MXA – 1 to 50 MHz For EXA – 10 MHz. |
| 2 | GPIB | A General Purpose Interface Bus (GPIB, IEEE 488.1) connection that can be used for remote analyzer operation. |

| Item | | Description |
|------|-----------------------------------|---|
| # | Name | |
| 3 | 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. |
| 4 | USB Connectors | Standard USB 2.0 ports, Type A. Connect to external peripherals such as a mouse, keyboard, printer, DVD drive, or hard drive. |
| 5 | MONITOR | Allows connection of an external VGA monitor. |
| 6 | LAN | A TCP/IP Interface that is used for remote analyzer operation. |
| 7 | Line power input | The AC power connection. See the product specifications for more details. |
| 8 | Removable Disk Drive | Standard on MXA. Optional on EXA. |
| 9 | Digital Bus | Reserved for future use. |
| 10 | Analog Out | Reserved for future use. |
| 11 | TRIGGER 2 OUT | A trigger output used to synchronize other test equipment with the analyzer. Configurable from the Input/Output keys. |
| 12 | TRIGGER 1 OUT | A trigger output used to synchronize other test equipment with the analyzer. Configurable from the Input/Output keys. |
| 13 | Sync | Reserved for future use. |
| 14 | TRIGGER 2 IN | Allows external triggering of measurements. |
| 15 | TRIGGER 1 IN | Allows external triggering of measurements. |
| 16 | Noise Source Drive +28 V (Pulsed) | For use with Agilent 346A, 346B, and 346C Noise Sources |
| 17 | SNS Series Noise Source | For use with Agilent N4000A, N4001A, N4002A Smart Noise Sources (SNS). |
| 18 | 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 |
|-------------------------|------------------|
| Help Map ID | 3496 |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Example: | :DISP:WIND:FORM:ZOOM sets zoomed :DISP:WIND:FORM:TILE sets un-zoomed |
| Preset: | TILE |
| Help Map ID: | 3497 |
| Instrument S/W Revision: | Prior to A.02.00 |

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> |
| Help Map ID: | 0 |
| Instrument S/W Revision: | Prior to A.02.00 |

Selected Window

One and only one window is always selected. The selected window has the focus; as far as you are 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 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

About the Analyzer
Window Control Keys

selected. If the selected window was zoomed, the next window will also be zoomed.

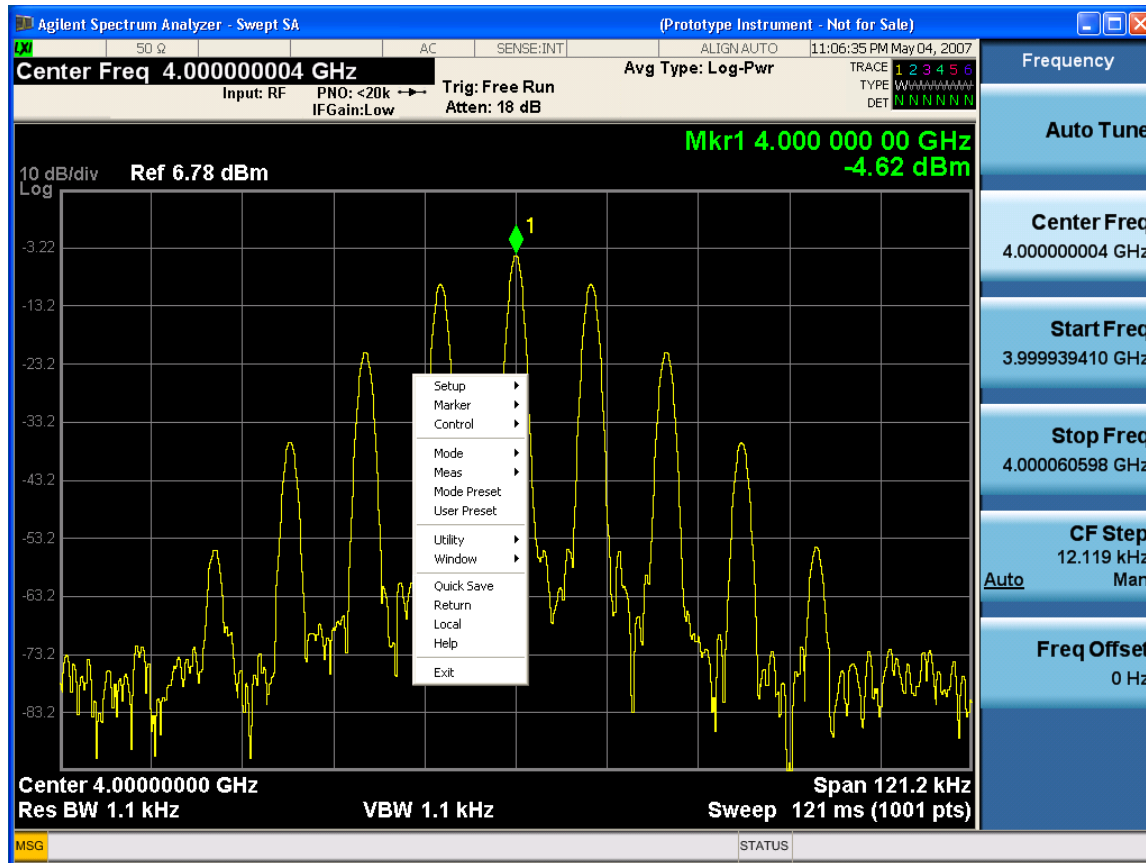
The window navigation does NOT use the arrow and select keys. Those are reserved for navigation within a window.

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.

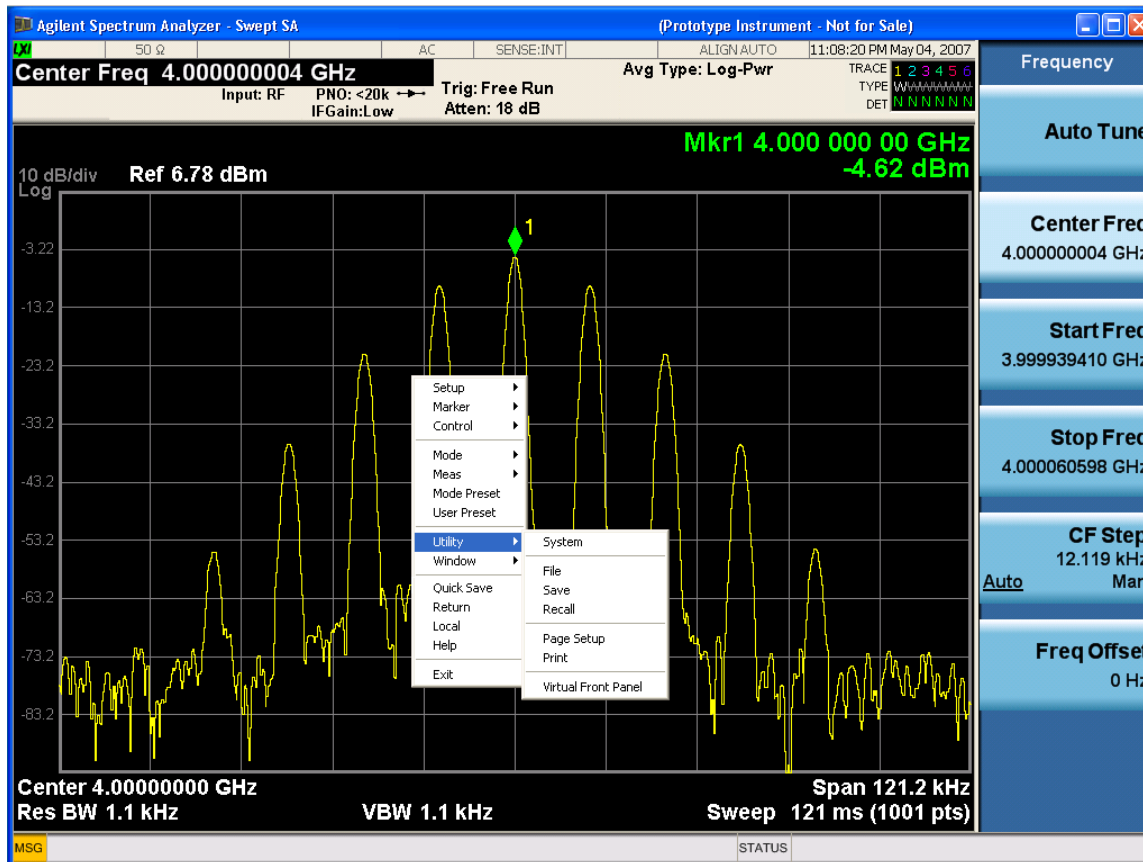
Right-Click

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



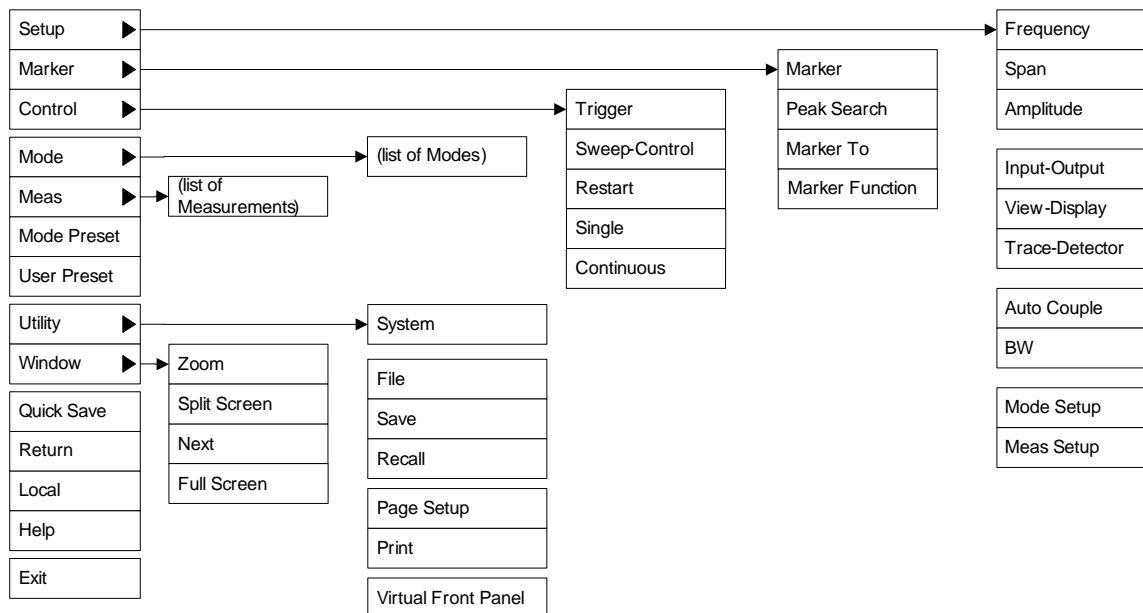
Placing the mouse on one of the rows marked with a right arrow symbol will cause that row to expand, as for example below where the mouse is hovered over the “Utility” row:

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:

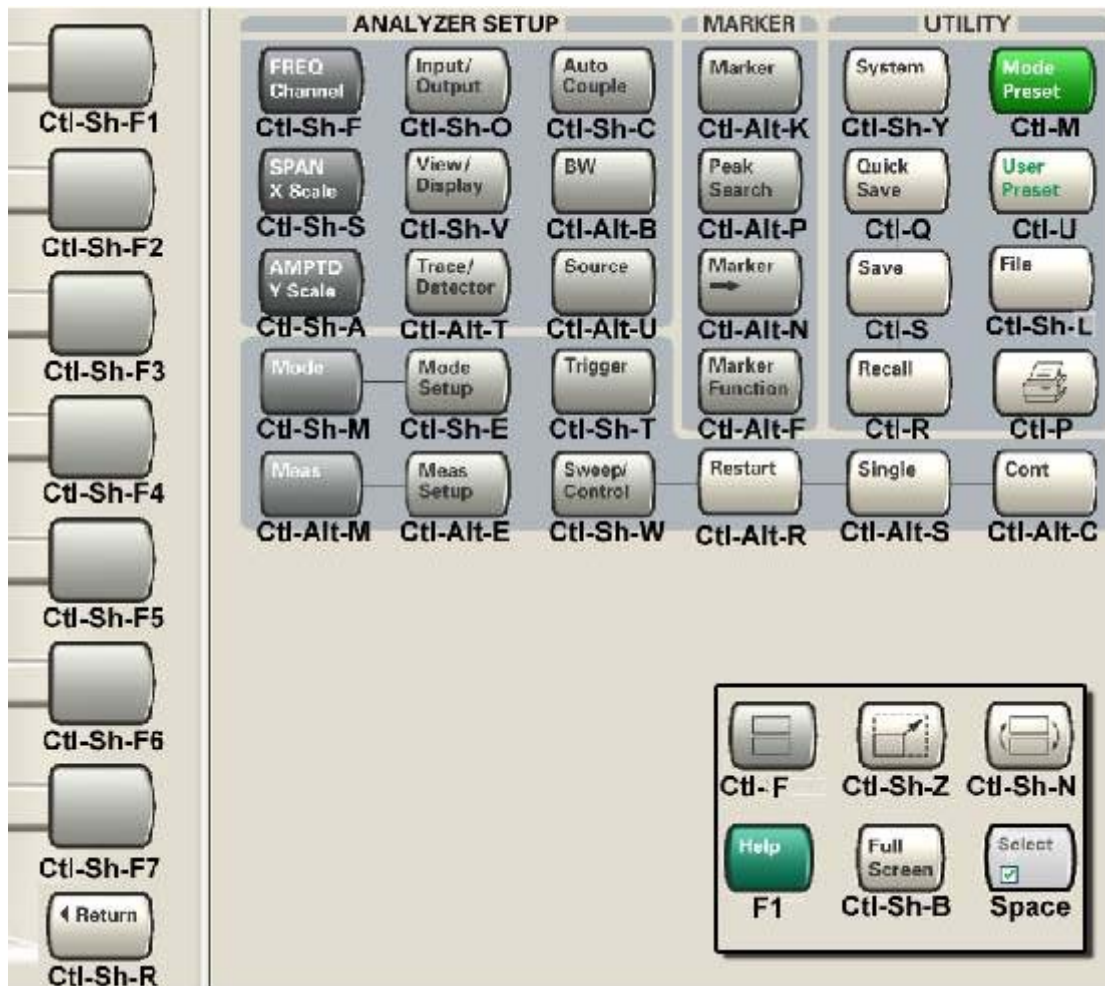
| | |
|-----------------|--------------|
| Frequency | CTRL+SHIFT+F |
| Span | CTRL+SHIFT+S |
| Amplitude | CTRL+SHIFT+A |
| Input/Output | CTRL+SHIFT+O |
| View/Display | CTRL+SHIFT+V |
| Trace/Detector | CTRL+ALT+T |
| Auto Couple | CTRL+SHIFT+C |
| Bandwidth | CTRL+ALT+B |
| Source | CTRL+SHIFT+E |
| 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+SHIFT+L |
| 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 |

About the Analyzer
Mouse and Keyboard Control

| | |
|--------------|---------------|
| Cont | CTRL+ALT+C |
| Zoom | CTRL+SHIFT+Z |
| Next Window | CTRL+SHIFT+N |
| Split Screen | CTRL+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 |
| 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 iDEN/WiDEN/MotoTalk Analyzer Measurement Application

This chapter provides overall information on the Agilent N6149A iDEN/WiDEN/MotoTalk Analyzer 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 N6149A iDEN/WiDEN/MotoTalk Analyzer Measurement Application Do?

The N6149A is a full-featured iDEN/WiDEN/MotoTalk 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 iDEN/WiDEN/MotoTalk signals.

The N6149A 2FP iDEN/WiDEN/MotoTalk Analyzer measurement application provides:

- iDEN Power Measurement
- iDEN Demod Measurement
- MotoTalk Measurement
- VSA Vector Analysis Measurement
- Monitor Spectrum Measurement

The N6149A 2FP iDEN/WiDEN/MotoTalk Analyzer measurement application supports the following standards:

- iDEN RF Interface Specification: Layer 1, version R02.00.06
- Requirement to Modify WiDEN Power Versus Time Mask
- Motorola TalkAround: RF Interface, Talk Around Protocol (8/19/2002)

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.

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

What Programming Information is Available?

The X-Series Documentation can be accessed through the Additional Documentation page in the instrument Help system and is included on the Documentation CD shipped with the instrument. It can also be found in the instrument at: C:\ProgramsFiles\Agilent\SignalAnalysis\Infrastructure\Help\otherdocs, or online at: http://www.agilent.com/find/mxa_manuals.

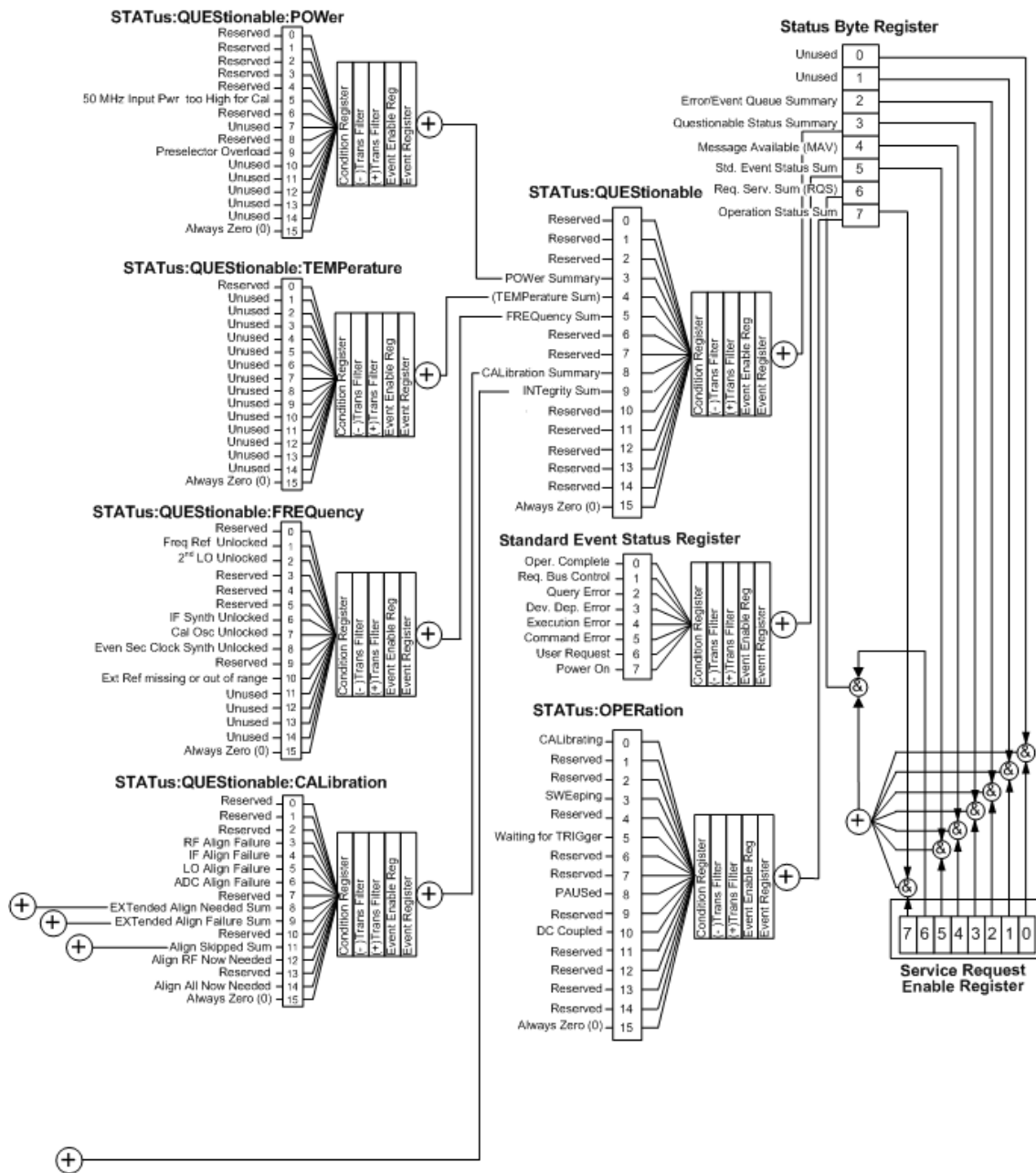
The following resources are available to help you create programs for automating your X-Series measurements:

| Resource | Description |
|--|---|
| X-Series Programmer's Guide | <p>Provides general SCPI programming information on the following topics:</p> <ul style="list-style-type: none">• Programming the X-Series Applications• Programming fundamentals• Programming examples <p>Note that SCPI command descriptions for measurement applications are NOT in this book, but are in the User's and Programmer's Reference.</p> |
| User's and Programmer's Reference manuals | <p>Describes all front-panel keys and softkeys, including SCPI commands for a measurement application. Note that:</p> <ul style="list-style-type: none">• Each measurement application has its own User's and Programmer's Reference.• The content in this manual is duplicated in the analyzer's Help (the Help that you see for a key is identical to what you see in this manual). |
| Embedded Help in your instrument | <p>Describes all front-panel keys and softkeys, including SCPI commands, for a measurement application.</p> <p>Note that the content that you see in Help when you press a key is identical to what you see in the User's and Programmer's Reference.</p> |
| X-Series Getting Started Guide | <p>Provides valuable sections related to programming including:</p> <ul style="list-style-type: none">• Licensing New Measurement Application Software - After Initial Purchase• Configuring instrument LAN Hostname, IP Address, and Gateway Address• Using the Windows XP Remote Desktop to connect to the instrument remotely• Using the Embedded Web Server Telnet connection to communicate SCPI <p>This printed document is shipped with the instrument.</p> |
| Agilent Application Notes | <p>Printable PDF versions of pertinent application notes.</p> |
| Agilent VISA User's Guide | <p>Describes the Agilent Virtual Instrument Software Architecture (VISA) library and shows how to use it to develop I/O applications and instrument drivers on Windows PCs.</p> |

STATus Subsystem (No equivalent front-panel keys)

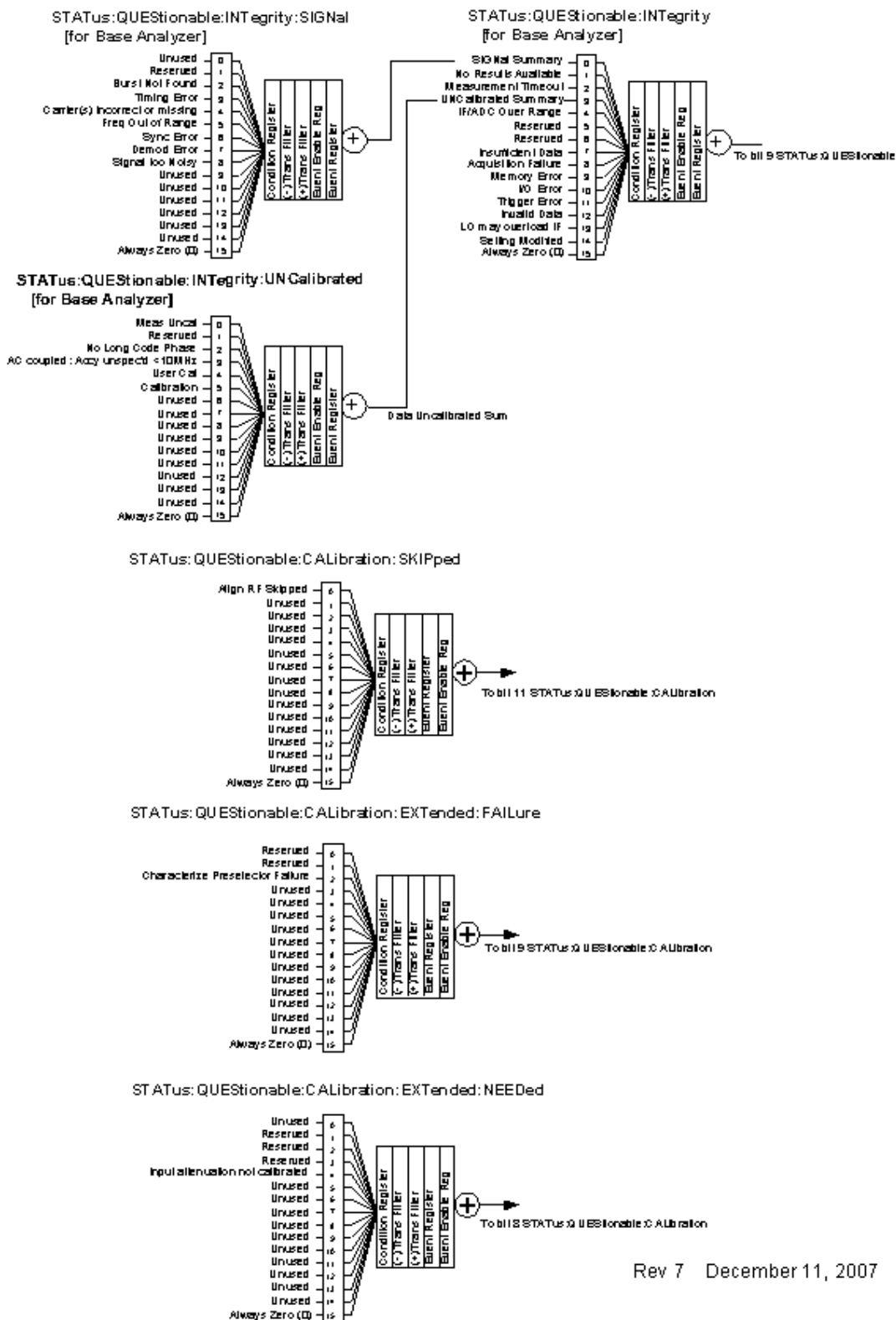
The following graphics show the current X-Series Status Register Subsystem implementation.

X-Series Status Byte Register System



Programming the Analyzer
STATUS Subsystem (No equivalent front-panel keys)

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



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 will come from a bit 10 positive transition. That output goes to the Integrity Sum bit 9 of the Status Questionable register.
5. You can do a similar thing with this register to only look at bit 9 using, STAT:QUES:ENAB 512.
6. The Status Questionable register output goes to the "Status Questionable Summary" bit 3 of the Status Byte Register. The output from this register can be enabled using the *SRE 8 command.
7. Finally, you would use the serial polling functionality available for the particular bus/software that you are using to monitor the Status Byte Register. (You could also use *STB? to poll the Status Byte Register.)

Using the Service Request (SRQ) Method

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

method, you must:

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

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

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

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

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

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

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

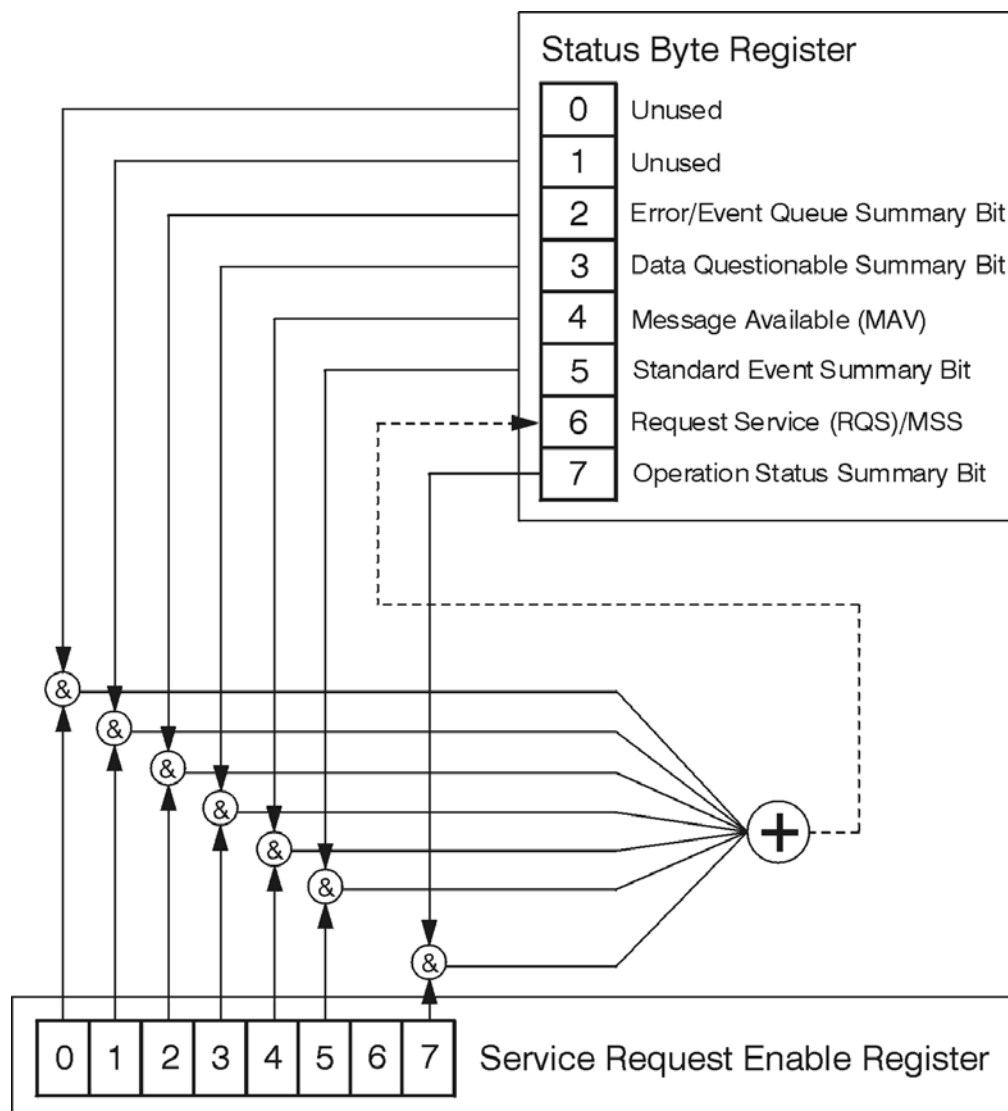
If the status register is configured to SRQ on end-of-measurement and the measurement is in continuous mode, then restarting a measurement (INIT command) can cause the measuring bit to pulse low. This causes an SRQ when you have not actually reached the "end-of-measurement" condition. To avoid this:

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 | <i>Standard Operation Status Summary Bit</i> | <i>Request Service (RQS) Summary Bit</i> | <i>Standard Event Status Summary Bit</i> | <i>Message Available (MAV)</i> | <i>Data Questionable Status Summary Bit</i> | <i>Error/Event Queue Summary Bit</i> | <i>Unused</i> | <i>Unused</i> | |
| 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 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.

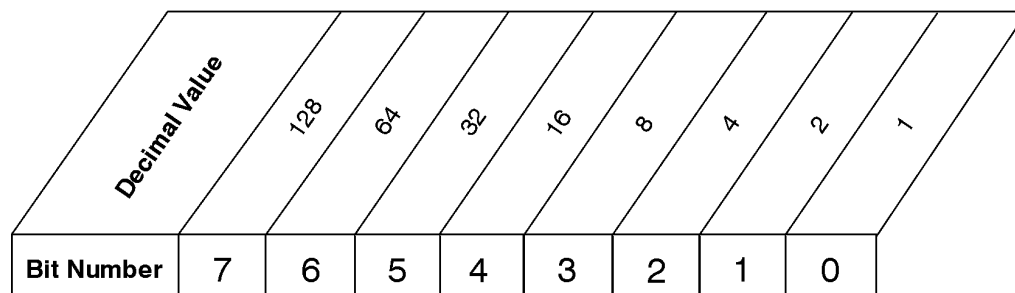
In addition to the status byte register, the status byte group also contains the service request enable register. This register lets you choose which bits in the status byte register will trigger a service request.

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

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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).

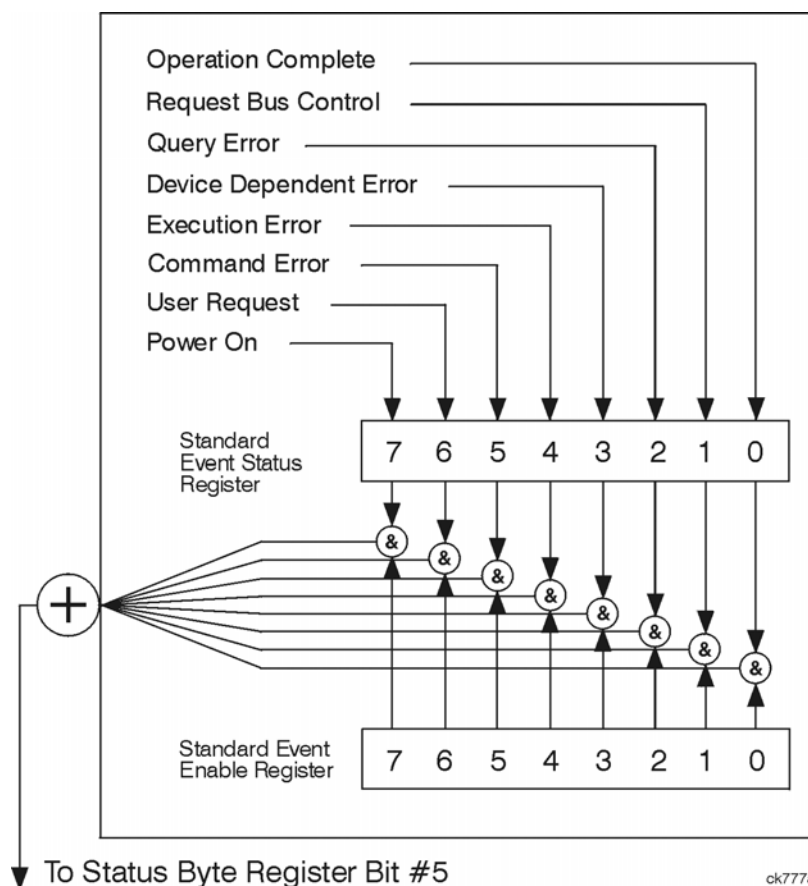


*SRE <num>
 *SRE?

Service Request Enable Register

ck726a

Standard Event Status Register



ck777a

The standard event status register contains the following bits:

| | | | | | | | | | |
|--------------------|----------|--------------------------|---------------|-----------------|------------------------|-------------|-----------------|--------------------|--|
| | | | | | | | | | |
| Description | Power On | User Request Key (Local) | Command Error | Execution Error | Device Dependent Error | Query Error | Request Control | Operation Complete | |
| Bit Number | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |

*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. |

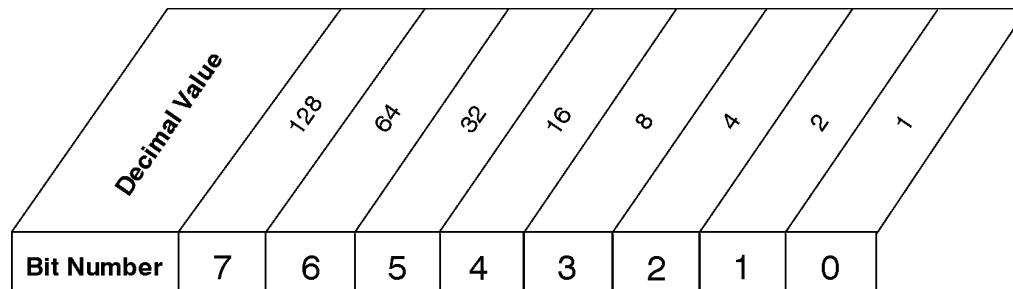
The standard event status register is used to determine the specific event that set bit 5 in the status byte register. To query the standard event status register, send the command *ESR?. The response will be the decimal sum of the bits which are enabled (set to 1). For example, if bit number 7 and bit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

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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 |
| Remote Command | :STATus:OPERation:CONDition? |
| Example | STAT:OPER:COND? |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

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

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

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

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

| | |
|-----------------------------------|----------------------------|
| Mode | All |
| Remote Command | :STATus:OPERation[:EVENT]? |
| Example | STAT:OPER? |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

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

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

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

Presets 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,

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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
Help Map ID: 0
Instrument S/W Revision: Prior to A.02.00

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.

Mode All
Remote Command :STATus:QUEStionable:CONDition?
Example STAT:QUES:COND?
Preset 0
SCPI Status Bits/OPC
Dependencies Sequential command
Help Map ID 0
Instrument S/W Revision Prior to A.02.00

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

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

Mode All

| | |
|-----------------------------------|---|
| Remote Command | :STATus:QUESTionable:ENABle 16 Sets the register so that temperature summary will be reported to the Status Byte Register |
| | :STATus:QUESTionable:ENABle? |
| Example | STAT:OPER:PTR 1 Align Now operation beginning will be reported to the Status Byte Register. |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

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

| | |
|-----------------------------------|-------------------------------|
| Mode | All |
| Remote Command | :STATus:QUESTionable[:EVENT]? |
| Example | STAT:QUES? |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|------|-----|
| Mode | All |
|------|-----|

Programming the Analyzer

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| | |
|-----------------------------------|---|
| 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' will be reported to the Status Byte Register. |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|-----------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUESTionable:PTRansition <integer> :STATus:QUESTionable:PTRansition? |
| Example | STAT:QUES:PTR 16 Temperature summary 'questionable asserted' will be reported to the Status Byte Register. |
| Preset | 32767 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Remote Command | :STATus:QUESTionable:CALibration:CONDition? |
| Example | STAT:QUES:CAL:COND? |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

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

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

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

| | |
|----------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration[:EVENT]? |

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| | |
|--------------------------------------|--------------------|
| Example | STAT:QUES:CAL? |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|--------------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:NTRansition <integer> :STATus:QUESTionable:CALibration:NTRansition? |
| Example | STAT:QUES:CAL:NTR 16384 Alignment is not required. |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|--------------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:PTRansition <integer> :STATus:QUESTionable:CALibration:PTRansition? |
| Example | STAT:QUES:CAL:PTR 16384 Alignment is required. |
| Preset | 32767 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |

| | |
|-------------------------|------------------|
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Remote Command | :STATus:QUESTionable:CALibration:SKIPped:CONDition? |
| Example | STAT:QUES:CAL:SKIP:COND? |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|-----------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:SKIPped:ENABle <integer> :STATus:QUESTionable:CALibration:SKIPped:ENABle? |
| Example | STAT:QUES:CAL:SKIP:ENAB 1 Can be used to query if an EMI alignment skipped condition is detected |
| Preset | 32767 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

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

| | |
|-----------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:SKIPped[:EVENT]? |
| Example | STAT:QUES:CAL:SKIP? |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|-----------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:SKIPped:NTRansition <integer> :STATus:QUESTionable:CALibration:SKIPped:NTRansition? |
| Example | STAT:QUES:CAL:SKIP:NTR 1 Align RF skipped is not required. |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

Questionable Calibration Skipped Positive Transition This command determines which bits in the Questionable Calibration Skipped Condition register will set the corresponding bit in the Questionable Calibration Skipped Event register when the condition register bit has a positive transition (0 to 1). The

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

| | |
|--------------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:SKIPped:PTRansition <integer> :STATus:QUESTionable:CALibration:SKIPped:PTRansition? |
| Example | STAT:QUES:CAL:SKIP:PTR 1 Align RF skipped is required. |
| Preset | 32767 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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:CONDi tion? |
| Example | STAT:QUES:CAL:EXT:FAIL:COND? |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|------|-----|
| Mode | All |
|------|-----|

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| | |
|-----------------------------------|---|
| 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 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

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

| | |
|-----------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:EXTended:FAILure[:EVENT]? |
| Example | STAT:QUES:CAL:EXT:FAIL? |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|------|-----|
| Mode | All |
|------|-----|

| | |
|--------------------------------------|---|
| Remote Command | :STATus:QUESTionable:CALibration:EXTended:FAILure:NTRan sition <integer> :STATus:QUESTionable:CALibration:EXTended:FAILure:NTRan sition? |
| Example | STAT:QUES:CAL:EXT:FAIL:NTR 1 EMI conducted align failure is not required. |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|--------------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:EXTended:FAILure:PTRan sition <integer> :STATus:QUESTionable:CALibration:EXTended:FAILure:PTRan sition? |
| Example | STAT:QUES:CAL:EXT:FAIL:PTR 1 EMI conducted align failure is required. |
| Preset | 32767 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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 Bits/OPC Dependencies | Sequential command |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|-----------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:EXTended:NEEDED:ENABLE<integer> :STATus:QUESTionable:CALibration:EXTended:NEEDED:ENABLE? |
| Example | STAT:QUES:CAL:EXT:NEED:ENAB 2 Can be used to query if an EMI conducted alignment is needed. |
| Preset | 32767 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

NOTE The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is

latched until it is queried. Once queried, the register is cleared.

| | |
|-----------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:EXTended:NEEDed[:EVENT]? |
| Example | STAT:QUES:CAL:EXT:NEED? |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|-----------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:EXTended:NEEDed:NTRansition <integer> :STATus:QUESTionable:CALibration:EXTended:NEEDed:NTRansition? |
| Example | STAT:QUES:CAL:EXT:NEED:NTR 2 Align EMI conducted is not required. |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|------|-----|
| Mode | All |
|------|-----|

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| | |
|-----------------------------------|---|
| 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 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|----------------|---|
| Mode | All |
| Remote Command | :STATus:QUEStionable:FREQuency:ENABle <integer> :STATus:QUEStionable:FREQuency:ENABle? |

| | |
|-----------------------------------|---|
| Example | STAT:QUES:FREQ:ENAB 2 Frequency Reference Unlocked will be reported to the Frequency Summary of the Status Questionable register. |
| Preset | 32767 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

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

| | |
|-----------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:FREQuency[:EVENT]? |
| Example | STAT:QUES:FREQ? |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|----------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:FREQuency:NTRansition <integer> :STATus:QUESTionable:FREQuency:NTRansition? |
| Example | STAT:QUES:FREQ:NTR 2 Frequency Reference 'regained lock' will be reported to the Frequency Summary of the Status Questionable register. |
| Preset | 0 |

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| | |
|-----------------------------------|--------------------|
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
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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 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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 Dependencies | Sequential command |

Help Map ID 0
 Instrument S/W Revision Prior to A.02.00

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

Mode All
 Remote Command :STATus:QUESTionable:INTEgrity:ENABle <integer>
 :STATus:QUESTionable:INTEgrity:ENABle?
 Example STAT:QUES:INT:ENAB 8 Measurement Uncalibrated Summary will be reported to the Integrity Summary of the Status Questionable register.
 Preset 32767
 SCPI Status Bits/OPC
 Dependencies Sequential command
 Min 0
 Max 32767
 Help Map ID 0
 Instrument S/W Revision Prior to A.02.00

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

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

Mode All
 Remote Command :STATus:QUESTionable:INTEgrity[:EVENT]?
 Example STAT:QUES:INT?
 Preset 0
 SCPI Status Bits/OPC
 Dependencies Sequential command
 Help Map ID 0
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Questionable Integrity Negative Transition This command determines which bits in the

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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 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|-----------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUESTionable:INTEgrity:PTRansition <integer> :STATus:QUESTionable:INTEgrity:PTRansition? |
| Example | STAT:QUES:INT:PTR 8 Measurement 'became uncalibrated' Summary will be reported to the Integrity Summary of the Status Questionable register. |
| Preset | 32767 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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 Dependencies | Sequential command |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|-----------------------------------|--|
| Mode | All |
| Remote Command | :STATUS:QUESTIONABLE:INTEGRITY:SIGNAl:ENABle <integer> :STATUS:QUESTIONABLE:INTEGRITY:SIGNAl:ENABle? |
| Example | STAT:QUES:INT:SIGN:ENAB 4 Burst Not Found will be reported to the Integrity Summary of the Status Questionable register. |
| Preset | 32767 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

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

| | |
|------|-----|
| Mode | All |
|------|-----|

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| | |
|-----------------------------------|--|
| Remote Command | :STATus:QUEStionable:INTEgrity:SIGNal[:EVENT]? |
| Example | STAT:QUES:INT:SIGN? |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|-----------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUEStionable:INTEgrity:SIGNal:NTRansition <integer> :STATus:QUEStionable:INTEgrity:SIGNal:NTRansition? |
| Example | STAT:QUES:INT:SIGN:NTR 4 Burst found will be reported to the Integrity Summary of the Status Questionable register. |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|----------------|--|
| Mode | All |
| Remote Command | :STATus:QUEStionable:INTEgrity:SIGNal:PTRansition <integer> :STATus:QUEStionable:INTEgrity:SIGNal:PTRansition? |
| Example | STAT:QUES:INT:SIGN:PTR 4 Burst not found will be reported to the Integrity Summary of the Status Questionable register. |
| Preset | 32767 |

| | |
|-----------------------------------|--------------------|
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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 Dependencies | Sequential command |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|-----------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUESTionable:INTEgrity:UNCalibrated:ENABle :STATus:QUESTionable:INTEgrity:UNCalibrated:ENABle? |
| Example | STAT:QUES:INT:UNC:ENAB 1 Oversweep (Meas Uncal) will be reported to the Integrity Summary of the Status Questionable register. |
| Preset | 32767 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |

Programming the Analyzer
STATus Subsystem (No equivalent front-panel keys)

| | |
|-------------------------|------------------|
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

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

| | |
|-----------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUESTionable:INTEgrity:UNCalibrated[:EVENT]? |
| Example | STAT:QUES:INT:UNC? |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|-----------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUESTionable:INTEgrity:UNCalibrated:NTRansition <integer> :STATus:QUESTionable:INTEgrity:UNCalibrated:NTRansition ? |
| Example | STAT:QUES:INT:UNC:NTR 1 Oversweep cleared will be reported to the Integrity Summary of the Status Questionable register. |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |

Help Map ID 0
 Instrument S/W Revision Prior to A.02.00

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

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

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
 Dependencies Sequential command
 Help Map ID 0

Programming the Analyzer
STATus Subsystem (No equivalent front-panel keys)

Instrument S/W Revision Prior to A.02.00

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

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

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

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

| | |
|-----------------------------------|---------------------------------------|
| Mode | All |
| Remote Command | :STATus:QUESTionable:POWer[:EVENT]? |
| Example | STAT:QUES:POW? |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

decimal values of the bits that you want to enable.

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

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

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

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 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

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

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

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

| | |
|------|-----|
| Mode | All |
|------|-----|

| | |
|-----------------------------------|---|
| Remote Command | :STATus:QUESTionable:TEMPerature[:EVENT]? |
| Example | STAT:QUES:TEMP? |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|-----------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUESTionable:TEMPerature:NTRansition <integer> :STATus:QUESTionable:TEMPerature:NTRansition? |
| Example | STAT:QUES:TEMP:NTR 1 Reference Oscillator Oven not cold will be reported to the Temperature Summary of the Status Questionable register. |
| Preset | 0 |
| SCPI Status Bits/OPC Dependencies | Sequential command |
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|----------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:TEMPerature:PTRansition <integer> :STATus:QUESTionable:TEMPerature:PTRansition? |
| Example | STAT:QUES:TEMP:PTR 1 Reference Oscillator Oven became cold will be reported to the Temperature Summary of the Status Questionable register. |
| Preset | 32767 |

Programming the Analyzer
STATus Subsystem (No equivalent front-panel keys)

| SCPI Status Bits/OPC Dependencies | Sequential command |
|--------------------------------------|--------------------|
| Min | 0 |
| Max | 32767 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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]?

Clear Status

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

| | |
|-----------------------------------|--|
| Key Path | No equivalent key. Related key System, Show Errors, Clear Error Queue |
| Remote Command | *CLS |
| Example | *CLS Clears the error queue and the Status Byte Register. |
| 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. |
| 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. |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

Standard Event Status Enable

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

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

| | |
|----------------|--|
| Key Path | No equivalent key. Related key System, Show Errors, Clear Error Queue |
| Remote Command | *ESE <integer> *ESE? |

| | |
|-----------------------------------|---|
| Example | *ESE 36 Enables the Standard Event Status Register to monitor query and command errors (bits 2 and 5). *ESE? Returns a 36 indicating that the query and command status bits are enabled. |
| Remote Command Notes | For related commands, see the STATus subsystem and SYSTem:ERRor[:NEXT]? commands. |
| Preset | 255 |
| SCPI Status Bits/OPC Dependencies | Event Enable Register of the Standard Event Status Register. |
| State Saved | Not saved in state. |
| Min | 0 |
| Max | 255 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

Standard Event Status Register Query

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

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

Identification Query

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

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

- Manufacturer

- Model
- Serial number
- Firmware version

| | |
|-------------------------|---|
| Key Path | No equivalent key. See related key System, Show System. |
| Remote Command | *IDN? |
| Example | *IDN? Returns instrument identification information, such as: Agilent Technologies,N9020A,US01020004,A.01.02 |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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. |
| Help Map ID: | 0 |
| Instrument S/W Revision: | Prior to A.02.00 |

Query Instrument Options

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

To be IEEE compliant, this command should return an arbitrary ascii variable that would not begin and end with quotes. But the quotes are needed to be backward compatible with previous Spectrum Analyzer 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?
Help Map ID: 0
Instrument S/W Revision: Prior to A.02.00

Recall Instrument State

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

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

Remote Command: *RCL <register #>
Example: *RCL 7 Recalls the instrument state that is currently stored in register 7.
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
Help Map ID: 0
Instrument S/W Revision: Prior to A.02.00

Save Instrument State

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

Remote Command: *SAV <register #>
Example: *SAV 9 Saves the instrument state in register 9.
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

Help Map ID: 0
 Instrument S/W Revision: Prior to A.02.00

Service Request Enable

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

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

Remote Command: *SRE <integer>
 *SRE?

Example: *SRE 22 Enables bits 1, 2, and 4 in the service request enable register.

Remote Command Notes: For related commands, see the STATus subsystem and SYSTem:ERRor[:NEXT]? commands.

Preset: 0

SCPI Status Bits/OPC Dependencies: Service Request Enable Register (all bits, 0 – 7).

Min: 0

Max: 255

Help Map ID: 0

Instrument S/W Revision: Prior to A.02.00

Status Byte Query

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

Remote Command: *STB?

Example: *STB? Returns a decimal value for the bits in the status byte register.
 For example, if a 16 is returned, it indicates that bit 5 is set and one of the conditions monitored in the standard event status register is set.

Remote Command Notes: See related command *CLS.

SCPI Status Bits/OPC Dependencies: Status Byte Register (all bits, 0 – 7).

Help Map ID: 0

Instrument S/W Revision: Prior to A.02.00

Trigger

This command triggers the instrument. Use the :TRIGger[:SEquence]:SOURce command to select the

trigger source.

| | |
|-------------------------|--|
| Key Path | No equivalent key. See related keys Single and Restart. |
| Remote Command | *TRG |
| Example | *TRG Triggers the instrument to take a sweep or start a measurement, depending on the current instrument settings. |
| Remote Command Notes | See related command :INITiate:IMMediate. |
| Help Map ID | 0 |
| Instrument S/W Revision | Prior to A.02.00 |

Self Test Query

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

| | |
|--------------------------|---|
| Remote Command: | *TST? |
| Example: | *TST? Runs the self-test routines and returns 0=passed, 1=some part failed. |
| Help Map ID: | 0 |
| Instrument S/W Revision: | Prior to A.02.00 |

Wait-to-Continue

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

| | |
|------------------------------------|---|
| Remote Command: | *WAI |
| Example: | INIT:CONT OFF; INIT:*WAI Sets the instrument to single sweep. Starts a sweep and waits for its completion. |
| 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. |
| Help Map ID: | 0 |
| Instrument S/W Revision: | Prior to A.02.00 |

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 Prior to A.02.00

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 Prior to A.02.00

Page Setup

Refer to your Microsoft Windows Operating System manual.

Instrument S/W Revision Prior to A.02.00

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? |
| Example | :SYST:PRIN:THEM FCOL |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |

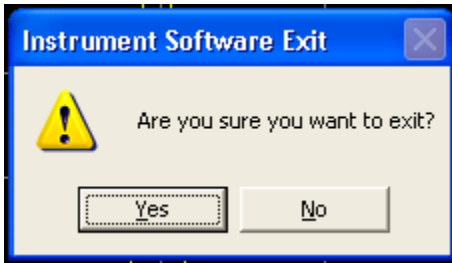
Print

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

you intended to exit the application:



| | |
|-------------------------|---|
| Key Path | File, Exit |
| Mode | All |
| Remote Command Notes | The Instrument Application will be closed. No further SCPI commands can be sent after this command. Use with caution! |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Example | :SYST:PRES |
| 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. |
| Restriction and Notes | Clears all pending OPC bits. The Status Byte is set to 0. |
| 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. |
| Instrument S/W Revision | Prior to A.02.00 |

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front panel access (Key Path). 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

System Functions

Preset

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 |
| Example | :INST:DEF |
| Remote Command Notes | Clears all pending OPC bits. The Status Byte is set to 0. |
| Restriction and Notes | A pop-up message comes up saying: "If you are sure, press key again". |
| 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. |
| Instrument S/W Revision | Prior to A.02.00 |

***RST (Remote Command Only)**

*RST is equivalent to :SYST:PRES:INIT:CONT OFF which is a Mode Preset in 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 |
| Example: | *RST |
| Remote Command Notes: | Sequential |
| Restriction and Notes: | Clears all pending OPC bits and the Status Byte is set to 0. |
| 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. |
| Instrument S/W Revision: | Prior to A.02.00 |

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 | Prior to A.02.00 |

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 you 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 you had not entered their own file name.

NOTE If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

| Key Path | Quick Save |
|-------------------------|--|
| Remote Command Notes | No remote command for this key specifically. |
| Instrument S/W Revision | Prior to A.02.00 |

Recall

Operation of this key is identical across several measurements. For details about this key, see [“Recall” on page 611](#).

Save

Operation of this key is identical across several measurements. For details about this key, see [“Save” on page 635](#).

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 | Prior to A.02.00 |

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

Errors

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

The list of errors displayed in the Errors screen does not automatically refresh; you must press the Refresh 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 the time is displayed to the second.

The fields on the Errors display are:

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

ID - Displays the error number.

Message - Displays the message text.

Repeat (RPT) - This field shows the number of consecutive instances of the event, uninterrupted by other events. 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.

| | |
|-------------------------|--|
| Key Path | System, Show |
| Mode | All |
| Remote Command | :SYSTem:ERRor[:NEXT]? |
| Example | :SYST:ERR? |
| 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. |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |

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

If on the last page of the log, the Next Page key is grayed out

If on the first page of the log, the Previous Page key is grayed out.

If there is only one page, both keys are grayed out.

| | |
|-------------------------|-----------------------------|
| Key Path | System, Show, Errors |
| Instrument S/W Revision | Prior to A.02.00 |

Previous Page See “Next Page” on page 183.

| | |
|-------------------------|-----------------------------|
| Key Path | System, Show, Errors |
| Instrument S/W Revision | Prior to A.02.00 |

History The History and Status keys select the Errors view. The Status key has a second line which

System Functions System

shows a number in [square brackets]. This is the number of currently open status items.

| | |
|-------------------------|-----------------------------|
| Key Path | System, Show, Errors |
| Instrument S/W Revision | Prior to A.02.00 |

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.

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

Refresh When pressed, refreshes the Show Errors display.

| | |
|-------------------------|-----------------------------|
| Key Path | System, Show, Errors |
| Instrument S/W Revision | Prior to A.02.00 |

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, Errors |
| Instrument S/W Revision | Prior to A.02.00 |

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 unavailable if the first page of information is presently displayed. The Next Page menu key is unavailable if the last page is information is presently displayed.

| | |
|-------------------------|---------------------|
| Key Path | System, Show |
| Mode | All |
| Example | SYST:SHOW SYST |
| Instrument S/W Revision | Prior to A.02.00 |

Hardware

The show hardware screen is used to view details of the installed hardware. This information can be used to determine versions of hardware assemblies and field programmable devices, in the advent of future upgrades or potential repair needs.

The screen is formatted into two groupings: product descriptive information and hardware information. The hardware information is listed in a table format:

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 | |
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The Previous Page is unavailable if the first page of information is presently displayed. The Next Page menu key is unavailable if the last page is information is presently displayed.

- Key Path **System, Show**
- Mode All
- Example SYST:SHOW HARD
- Instrument S/W Revision Prior to A.02.00

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 Prior to A.02.00

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 Prior to A.02.00

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

Key Path **System, Show, Errors**

Instrument S/W Revision Prior to A.02.00

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

Key Path **System, Show, Errors**

Instrument S/W Revision Prior to A.02.00

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**

System Functions

System

| | |
|-------------------------|--|
| 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 | Prior to A.02.00 |

Clear Clears the event log of all entries.

| | |
|-------------------------|---|
| Key Path | System, Show, LXI, LXI Event Log |
| Remote Command | :LXI:EVENT:LOG:CLEAR |
| Example | :LXI:EVEN:LOG:CLEAR |
| Instrument S/W Revision | Prior to A.02.00 |

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:EVEN: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 | Prior to A.02.00 |

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:EVEN: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 Prior to A.02.00

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: Prior to A.02.00

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: Prior to A.02.00

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: Prior to A.02.00

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: Prior to A.02.00

System Functions

System

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:EVENT:LOG:CIRCular:FBENry

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

Instrument S/W Revision: Prior to A.02.00

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.

| | |
|-------------------------|---|
| Key Path | System |
| Mode | All |
| Remote Command | :SYSTem:PON:TYPE MODE USER LAST PRESet :SYSTem:PON:TYPE? |
| Example | :SYST:PON:TYPE MODE |
| Preset | This is unaffected by Preset but is set to Mode on a “Restore System Defaults->All” |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |

Mode and Input/Output Defaults

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

| | |
|-------------------------|-------------------------|
| Key Path | System, Power On |
| Mode | All |
| Example | SYST:PON:TYPE MODE |
| Instrument S/W Revision | Prior to A.02.00 |

User Preset

Sets **Power On** to **User Preset**. When the analyzer is powered on in User Preset, it will User Preset each mode and switch to the power-on mode. Power On User Preset will not affect any settings beyond what a normal User Preset affects.

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

| | |
|-------------------------|-------------------------|
| Key Path | System, Power On |
| Mode | All |
| Example | SYST:PON:TYPE USER |
| Instrument S/W Revision | Prior to A.02.00 |

Last State

Sets **Power On** to **Last**. When the analyzer is powered on, it will put all modes in the last state they were in prior to when the analyzer was put into Power Standby and it will wake up in the mode it was last in prior to powering off the instrument. The saving of the active mode prior to shutdown happens behind the scenes when a controlled shutdown is requested by using the front panel power **Standby** key or by using the remote command `SYSTem:PDOWn`. The non-active modes are saved as they are deactivated and recalled by Power On Last State.

NOTE 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.

| | |
|-------------------------|---|
| Key Path | System, Power On |
| Mode | All |
| Example | SYST:PON:TYPE LAST |
| Restriction and Notes | Power on Last State only works if you have done a controlled shutdown prior to powering on in Last. If a controlled shutdown is not done when in Power On Last State, the instrument will power up in the last active mode, but it may not power up in the active mode's last state. If an invalid mode state is detected, a Mode Preset will occur. To control the shutdown under remote control use the <code>:SYSTem:PDOWn</code> command. |
| Instrument S/W Revision | Prior to A.02.00 |

Power On Application

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 application is used for Power On Type "Mode and Input/Output Defaults" and Restore System Defaults All.

| | |
|----------|-------------------------|
| Key Path | System, Power On |
|----------|-------------------------|

System Functions

System

| | |
|-------------------------|---|
| Mode | All |
| Remote Command | :SYSTem:PON:MODE SA BASIC ADEMOD NFIGURE PNOISE CDMA2K TDSCDMA VSA VSA89 601 WCDMA WIMAXOFDMA :SYSTem:PON:MODE? |
| Example | SYST:PON:MODE SA |
| Restriction and Notes | The list of possible modes (and remote parameters) to choose from is dependent on which modes are installed in the instrument. |
| Preset | This is unaffected by 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 | Prior to A.02.00 |

Configure Applications

The Configure Application utility allows you configure the bootup for fastest first mode switch time or faster boot time. In addition, there are more applications available for the X-Series than can fit into Windows® Virtual Memory. The Configure Application utility allows you to choose which licensed applications to load in-memory. There will be multiple opportunities for you to perform the configuration.

The Configure Applications utility will provide a graphical representation of the amount of Virtual Memory consumed. The indicator will be green when <90% of the memory limit is consumed, yellow for memory consumption is 90% to 100%, and red when consumption is >100% of the limit.

| | |
|-------------------------|-------------------------|
| Key Path | System, Power On |
| Instrument S/W Revision | A.02.00 |

Configure Applications - Next application startup

Select All Select All marks all applications in the selection list. This allows you to enable all applications licensed on the instrument for pre-loading, or is a convenience for selecting all applications in one operation and then letting you deselect individual applications.

| | |
|-------------------------|---|
| Key Path | System, Power On, Configure Applications |
| Instrument S/W Revision | A.02.00 |

Deselect All Deselect All removes marks from all applications in the selection list, with the exception of the Power On application (the Power On application cannot be eliminated from the pre-load list). This allows you to disable all applications licensed on the instrument for pre-loading (with the exception of the Power On application), or is a convenience for deselecting all applications in one operation and then

select individual applications.

| | |
|-------------------------|---|
| Key Path | System, Power On, Configure Applications |
| Instrument S/W Revision | A.02.00 |

Move Up The application list is the order in which applications appear in the Mode Menu. Move Up shifts the selected application up in the list, thus moving the selected application earlier in the Mode Menu.

| | |
|-------------------------|---|
| Key Path | System, Power On, Configure Applications |
| Instrument S/W Revision | A.02.00 |

Move Down The application list is the order in which applications appear in the Mode Menu. Move Down shifts the selected application down in the list, thus moving the selected application later in the Mode Menu.

| | |
|-------------------------|---|
| Key Path | System, Power On, Configure Applications |
| Instrument S/W Revision | A.02.00 |

Select/Deselect Toggles the currently highlighted application in the list.

| | |
|-------------------------|---|
| Key Path | System, Power On, Configure Applications |
| Instrument S/W Revision | A.02.00 |

Save Changes Applies the configuration of applications list: marked application will be pre-loaded in memory the next time the instrument application is started, and the order of applications in the list will be the order of applications in the Mode Menu.

| | |
|-------------------------|--|
| Key Path | System, Power On, Configure Applications |
| Notes | The menu key will be unavailable when the virtual memory of the selected applications exceeds 100% of the limit. |
| Instrument S/W Revision | A.02.00 |

System Restart System Restart provides a means to restart the instrument application. Upon restart the applications in the pre-load list will be loaded in memory.

| | |
|----------------|---|
| Key Path | System, Power On, Configure Applications |
| Remote Command | :SYSTem:PUP:PROcEss |
| Example | :SYST:PUP:PROC Must Wait after this command for the instrument application to restart |

Notes You cannot use *WAI or *OPC? to synchronize operation; this command stops and restarts the instrument application, thus the SCPI operation is terminated and restarted. A remote program must use fixed wait time to resume sending commands to the instrument. The wait time will be dependent upon which applications are pre-loaded.

Instrument S/W Revision A.02.00

Configure Applications - Remote commands

Configuration list (Remote command only) This remote command is used to set or query the list of applications to be loaded in-memory.

Remote Command: :SYSTem:PON:APPLication:LLISt <string of INSTRument:SELEct names>
:SYSTem:PON:APPLication:LLISt?

Example: :SYST:PON:APPL:LLIS "SA,BASIC,WCDMA"

Notes: <string of INSTRument:SELEct names> are from the enums of the :INSTRument:SELEct command in Meas Common section 13.3
The order of the <INSTRument:SELEct names> is the order in which the applications are loaded into memory, and the order in which they appear in the Mode Menu.

Error -225 "Out of Memory" is reported when more applications are listed than can reside in Virtual Memory. In such circumstance the existing applications load list is unchanged.

Preset: Not affected by Preset

State Saved: Not saved in state

Instrument S/W Revision: A.02.00

Configuration Memory Available (Remote command only) This remote command is used to query the amount of Virtual Memory remaining.

Remote Command: :SYSTem:PON:APPLication:VMEMory[:AVAIlable]?

Example: :SYST:PON:APPL:VMEM?

Preset: Not affected by Preset

Instrument S/W Revision: A.02.00

Configuration Memory Total (Remote command only) This remote command is used to query the limit of Virtual Memory allowed for applications.

Remote Command: :SYSTem:PON:APPLication:VMEMory:TOTAL?

Example: :SYST:PON:APPL:VMEM:TOT?

Preset: Not affected by Preset
Instrument S/W Revision: A.02.00

Configuration Memory Used (Remote command only) This remote command is a query of the amount of Virtual Memory used by all measurement applications.

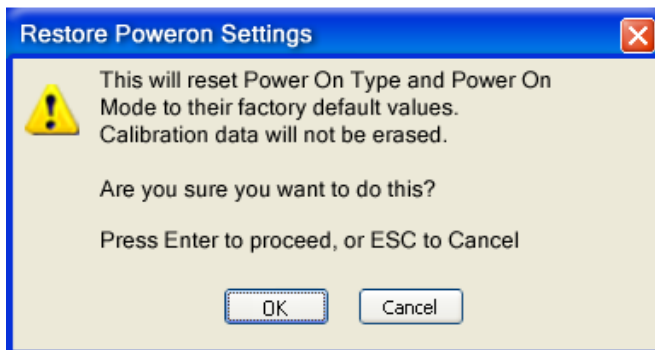
Remote Command: :SYSTem:PON:APPLication:VMEMory:USED?
Example: :SYST:PON:APPL:VMEM:USED?
Preset: Not affected by Preset
Instrument S/W Revision: A.02.00

Configuration Application Memory (Remote command only) This remote command is used to query the amount of Virtual Memory a particular application consumes.

Remote Command: :SYSTem:PON:APPLication:VMEMory:USED:NAME?
<INSTRument:SELEct name>
Example: :SYST:PON:APPL:VMEM:USED:NAME? CDMA2K
Notes: <INSTRument:SELEct name> is from the enums of the :INSTRument:SELEct command in Meas Common section 13.3
Value returned will be 0 (zero) if the name provided is invalid.
Preset: Not affected by Preset
Instrument S/W Revision: A.01.70 or later

Restore Power On Defaults

This selection causes the Power On Type and Power On Application 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

System Functions System

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 | Prior to A.02.00 |

Alignments

The Alignments Menu controls and displays the automatic alignment of the instrument, and provides the ability to restore the default alignment values.

The current setting of the alignment system is displayed in the system Settings Panel along the top of the display, including a warning icon for conditions that may cause specs to be impacted, for example:



| | |
|-------------------------|------------------|
| Key Path | System |
| Instrument S/W Revision | Prior to A.02.00 |

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**.

| | |
|-----------------------------------|--|
| Key Path | System, Alignments |
| Mode | All |
| Remote Command | :CALibration:AUTO ON PARTial OFF ALERT :CALibration:AUTO? |
| Example | :CAL:AUTO ON |
| Restriction and Notes | While Auto Align is executing, bit 0 of Status Operation register is set. |
| Preset | This is unaffected by Preset but is set to ON upon a "Restore System Defaults->Align". |
| 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. |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-----------------------------------|---|
| Key Path | System, Alignments, Auto Align |
| Mode | All |
| Example | :CAL:AUTO ON |
| 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. |
| 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. |
| Instrument S/W Revision | Prior to A.02.00 |

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

System Functions

System

icon. The warning icon is to inform the operator that they are responsible for maintaining the warranted operation of the instrument

| | |
|-------------------------|---|
| Key Path | System, Alignments, Auto Align |
| Mode | All |
| Example | :CAL:AUTO PART |
| Restriction and Notes | Auto Align Partial begins the elapsed time counter for Auto Align Off time. |
| Instrument S/W Revision | Prior to A.02.00 |

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:

| | |
|-------------------------|---|
| Key Path | System, Alignments, Auto Align |
| Mode | All |
| Example | :CAL:AUTO OFF |
| Restriction and Notes | Auto Align Off begins the elapsed time counter for Auto Align Off time. |
| Dependencies/Couplings | Auto Align is set to Off if Restore Align Data is invoked. |
| Instrument S/W Revision | Prior to A.02.00 |

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):

| | |
|-------------------------|---|
| Key Path | System, Alignments, Auto Align |
| Mode | All |
| Remote Command | :CALibration:AUTO:MODE ALL NRF :CALibration:AUTO:MODE? |
| Example | :CAL:AUTO:MODE NRF |
| Preset | This is unaffected by Preset but is set to ALL on a “Restore System Defaults->Align”. |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-----------------------------------|---|
| Key Path | System, Alignments, Auto Align |
| Mode | All |
| Remote Command | :CALibration:AUTO:ALERT TTEMPerature DAY WEEK NONE :CALibration:AUTO:ALERT? |
| Example | :CAL:AUTO:ALER TTEM |
| Remote Command Notes | The alert that alignment is needed is the setting of bit 14 in the Status Questionable Calibration register. |
| Preset | This is unaffected by Preset but is set to TTEMPerature on a “Restore System Defaults->Align”. |
| 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. |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |

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.

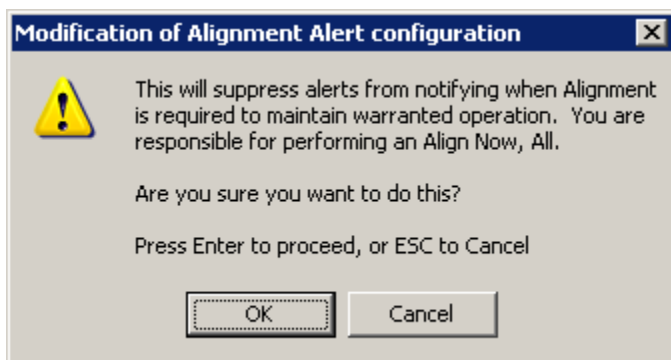
| | |
|----------|--|
| Key Path | System, Alignments, Auto Align, Alert |
|----------|--|

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| | |
|-----------------------------------|--|
| Mode | All |
| Example | :CAL:AUTO:ALER TTEM |
| SCPI Status Bits/OPC Dependencies | Bit 14 is set in the Status Questionable Calibration register. |
| Instrument S/W Revision | Prior to A.02.00 |

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:

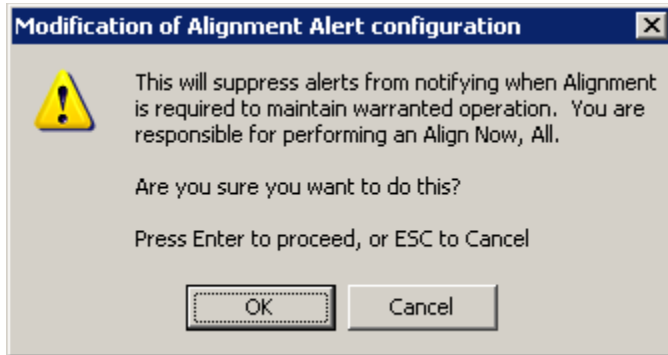


No confirmation is required when Alert is configured through a remote command.

| | |
|-----------------------------------|--|
| Key Path | System, Alignments, Auto Align, Alert |
| Mode | All |
| Example | :CAL:AUTO:ALER DAY |
| SCPI Status Bits/OPC Dependencies | Bit 14 is set in the Status Questionable Calibration register. |
| Instrument S/W Revision | Prior to A.02.00 |

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:

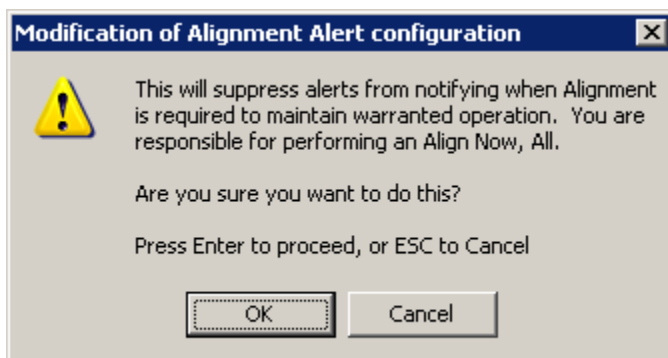


No confirmation is required when Alert is configured through a remote command.

| | |
|-----------------------------------|--|
| Key Path | System, Alignments, Auto Align, Alert |
| Mode | All |
| Example | :CAL:AUTO:ALER WEEK |
| SCPI Status Bits/OPC Dependencies | Bit 14 is set in the Status Questionable Calibration register. |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|----------|--|
| Key Path | System, Alignments, Auto Align, Alert |
| Mode | All |
| Example | :CAL:AUTO:ALER NONE |

System Functions

System

Instrument S/W Revision Prior to A.02.00

Align Now

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

Key Path **System, Alignments**

Instrument S/W Revision Prior to A.02.00

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.

Key Path **System, Alignments, Align Now**

Mode All

Remote Command :CALibration[:ALL]
 :CALibration[:ALL]?

| | |
|-----------------------------------|--|
| Example | :CAL |
| Remote Command Notes | :CALibration[:ALL]? returns 0 if successful :CALibration[:ALL]? returns 1 if failed :CALibration[:ALL]? is the same as *CAL? While Align Now, All is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORT command. Successful completion will clear bit 14 in the Status Questionable Calibration register. An interfering user signal is not grounds for failure of Align Now, All. However, bits 11 and 12 are set in the Status Questionable Calibration register to indicate Align Now, RF is required. |
| Restriction and Notes | An interfering user supplied signal will result in the instrument requiring an Align Now, RF with the interfering signal removed. |
| 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, 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. |
| Instrument S/W Revision | Prior to A.02.00 |
| Mode | All |
| Remote Command | *CAL? |
| Example | *CAL? |
| 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]? |
| Restriction and Notes | Everything about :CALibration[:ALL]? is synonymous with *CAL? including all conditions, status register bits, and couplings |
| Instrument S/W Revision | Prior to A.02.00 |

All but RF Immediately executes an alignment of all subsystems except the RF subsystem. The

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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.

| | |
|-----------------------------------|---|
| Key Path | System, Alignments, Align Now |
| Mode | All |
| Remote Command | :CALibration:NRF :CALibration:NRF? |
| Example | :CAL:NRF |
| 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”. |
| 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. |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|----------------------|---|
| Key Path | System, Alignments, Align Now |
| Mode | All |
| Remote Command | :CALibration:RF :CALibration:RF? |
| Example | :CAL:RF |
| Remote Command Notes | :CALibration:RF? returns 0 if successful :CALibration:RF? returns 1 if failed (including interfering user signal) While Align Now, RF is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. Successful completion will clear bits 3, 11, and 12 in the Status Questionable Calibration register. A failure encountered during alignment will set the Error Condition “Align RF failed” and set bit 3 in the Status Questionable Calibration register. An interfering user signal will result in bits 11 and 12 to be set in the Status Questionable Calibration register to indicate Align Now, RF is required. |

System Functions System

| | |
|-----------------------------------|---|
| Restriction and Notes | An interfering user supplied signal will result in the instrument requiring an Align Now, RF with the interfering signal removed. |
| 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. |
| Instrument S/W Revision | Prior to A.02.00 |

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 | Prior to A.02.00 |

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.

| | |
|-------------------------|---|
| Key Path | System, Alignments, Align Now |
| Mode | All |
| Remote Command | :CALibration:YTF :CALibration:YTF? |
| Example | :CAL:YTF |
| 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. For Option 507, 508, 513, and 526 only. |
| Dependencies/Couplings | Initializes the time for the Last Characterize Preselector Time. Records the temperature for the Last Characterize Preselector Temperature. |
| Instrument S/W Revision | Prior to A.02.00 |

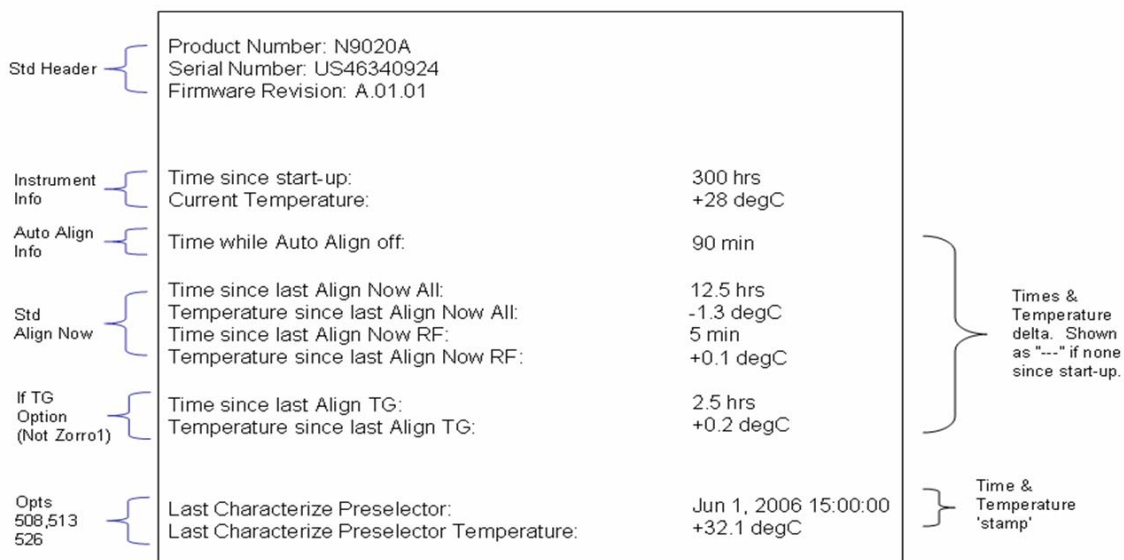
Show Alignment Statistics

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:

System Functions System



A successful Align Now, RF will set the Last Align RF temperature to the current temperature, and reset the Last Align RF time. A successful Align Now, All or Align Now, All but RF will set the Last Align Now All temperature to the current temperature, and reset the Last Align Now All time. A successful Align Now, All will also reset the Last Align RF items if the RF portion of the Align Now succeeded.

| | |
|-------------------------|---|
| Key Path | System, Alignments |
| Mode | All |
| 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. |
| Instrument S/W Revision | Prior to A.02.00 |

| | |
|-------------------------|--|
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :SYSTem:PON:TIME? |
| Example | :SYST:PON:TIME? |
| Restriction and Notes | Value is the time since the most recent start-up in seconds. |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |

| | |
|----------------|--|
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:TEMPerature:CURRENT? |

| | |
|-------------------------|---|
| Example | :CAL:TEMP:CURR? |
| Restriction and Notes | Value is in degrees Centigrade. Value is invalid if using default alignment data (Align Now, All required) |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:TIME:LALL? |
| Example | :CAL:TIME:LALL? |
| 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. |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:TEMPerature:LALL? |
| Example | :CAL:TEMP:LALL? |
| Restriction and Notes | Value is in degrees Centigrade at which the last successful Align Now, All or Align Now, All but RF was executed. |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:TIME:LRF? |
| Example | :CAL:TIME:LRF? |
| 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. |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |
| Key Path | Visual annotation in the Show Alignment Statistics screen |

System Functions
System

| | |
|-------------------------|--|
| Mode | All |
| Remote Command | :CALibration:TEMPerature:LRF? |
| Example | :CAL:TEMP: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. |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:TIME:LPreselector? |
| Example | :CAL:TIME:LPR? |
| 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. |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:TEMPerature:LPreselector? |
| Example | :CAL:TEMP:LPR? |
| Restriction and Notes | Value is in degrees Centigrade at which the last successful Characterize Preselector was executed. |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:AUTO:TIME:OFF? |
| Example | :CAL: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. |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|--|
| Key Path | System, Alignments |
| Mode | All |
| Remote Command | :CALibration:FREQuency:REFerence:MODE CALibrated USER :CALibration:FREQuency:REFerence:MODE? |
| Example | :CAL:FREQ:REF:MODE CAL |
| 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. |
| Preset | This is unaffected by Preset but is set to CALibrated on a “Restore System Defaults->Align”. |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|---|
| Key Path | System, Alignments, Timebase DAC |
| Mode | All |
| Example | :CAL:FREQ:REF:MODE CAL |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|---|
| Key Path | System, Alignments, Timebase DAC |
| Mode | All |
| Example | :CAL:FREQ:REF:MODE USER |
| Instrument S/W Revision | Prior to A.02.00 |

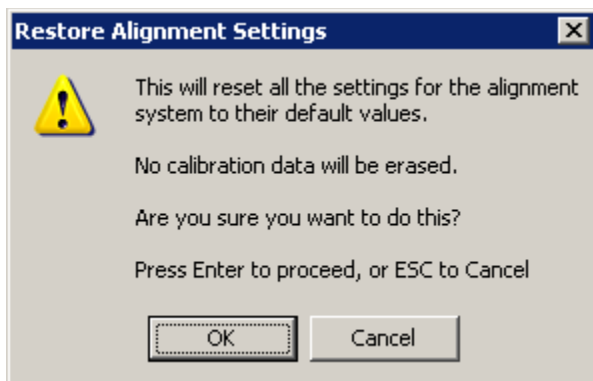
System Functions System

| | |
|--------------------------|--|
| Key Path | System, Alignments, Timebase DAC |
| Mode | All |
| Remote Command | :CALibration:FREQuency:REFErence:FINE <integer> :CALibration:FREQuency:REFErence:FINE? |
| Example | :CAL:FREQ:REF:FINE 8191 |
| 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. |
| Preset | This is unaffected by Preset but is set to the factory setting on a “Restore System Defaults->Align”. |
| Dependencies/Couplings | Setting :CAL:FREQ:REF:FINE sets :CAL:FREQ:REF:MODE USER |
| State Saved | No |
| Min | 0 |
| Max | 16383 |
| Instrument S/W Revision | Prior to A.02.00 |
| Remote Command: | :CALibration:FREQuency:REFErence:COARse <integer> :CALibration:FREQuency:REFErence:COARse? |
| Example: | :CAL:FREQ:REF:COAR 8191 |
| 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 |
| Instrument S/W Revision: | Prior to A.02.00 |

Restore Align Defaults

Initializes the alignment user interface settings, not alignment data, to the factory default values. Align Now, All must be executed if the value of the Timebase DAC results in a change.

For front panel operation, you are prompted to confirm action before setting the alignment parameters to factory defaults:



The parameters affected are:

| Parameter | Setting |
|-------------------------|--|
| Timebase DAC | Calibrated |
| Timebase DAC setting | Calibrated value |
| Auto Align State | Normal (if the instrument is not operating with default alignment data, Off otherwise) |
| Auto Align All but RF | Off |
| Auto Align Alert | Time & Temperature |
| | |
| Key Path | System, Alignments |
| Mode | All |
| Example | :SYST:DEF ALIG |
| 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. |
| Instrument S/W Revision | Prior to A.02.00 |

Backup and Restore Alignment Data

Alignment data for the instrument resides on the hard drive in a database. Agilent uses high quality hard drives; however it is highly recommended the alignment data be backed-up to storage outside of the instrument. Additionally, for customers who use multiple CPU Assemblies or multiple disk drives, the alignment that pertains to the instrument must be transferred to the resident hard drive after a CPU or hard drive is replaced. This utility facilitates backing-up and restoring the alignment data.

NOTE This utility allows the operator to navigate to any location of the Windows file system. It is intended that the operator use an USB memory device or Mapped Network Drive to backup the alignment data to storage outside of the instrument.

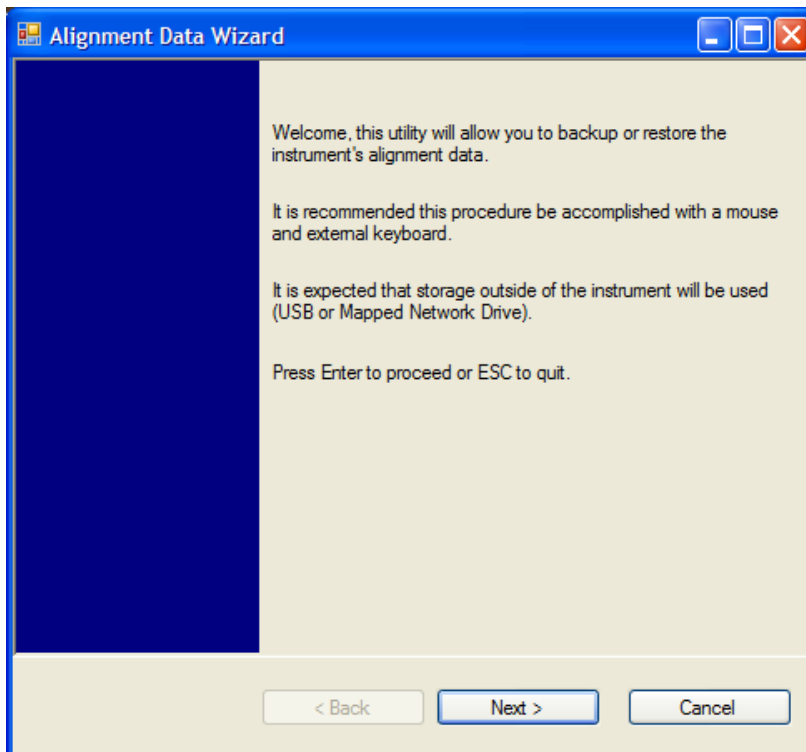
System Functions System

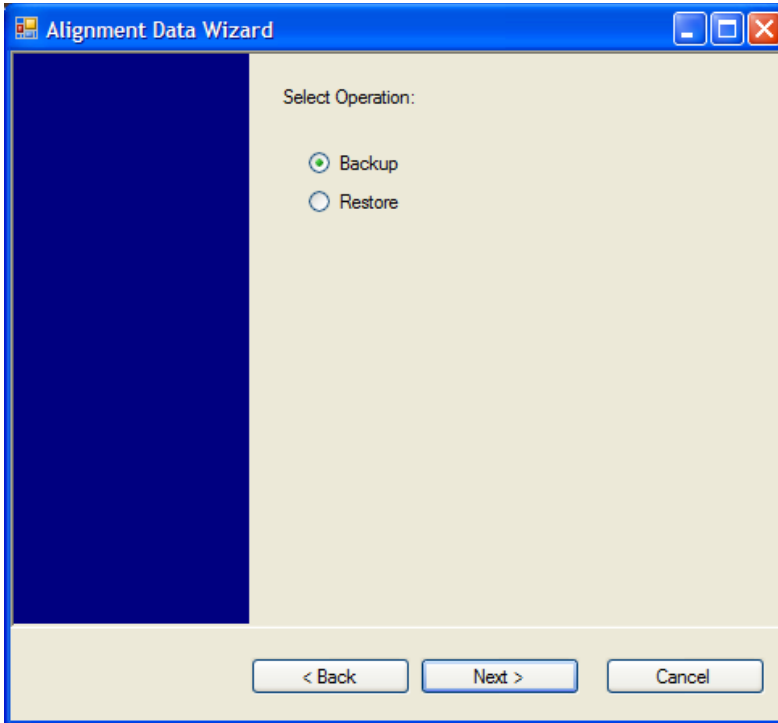
Backup or Restore Align Data... Opens the utility for backing-up or restoring the alignment data.

| | |
|-------------------------|--|
| Key Path | System, Alignments |
| Instrument S/W Revision | A.02.00 |
| Key Path | System, Alignments |
| Mode | All |
| Remote Command | :CALibration:DATA:DEFault |
| Example | :CAL:DATA:DEF |
| 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. |
| Instrument S/W Revision | Prior to A.02.00 |

Alignment Data Wizard The Backup or Restore Alignment Data wizard will guide the you through the operation of backing-up or restoring the alignment data.

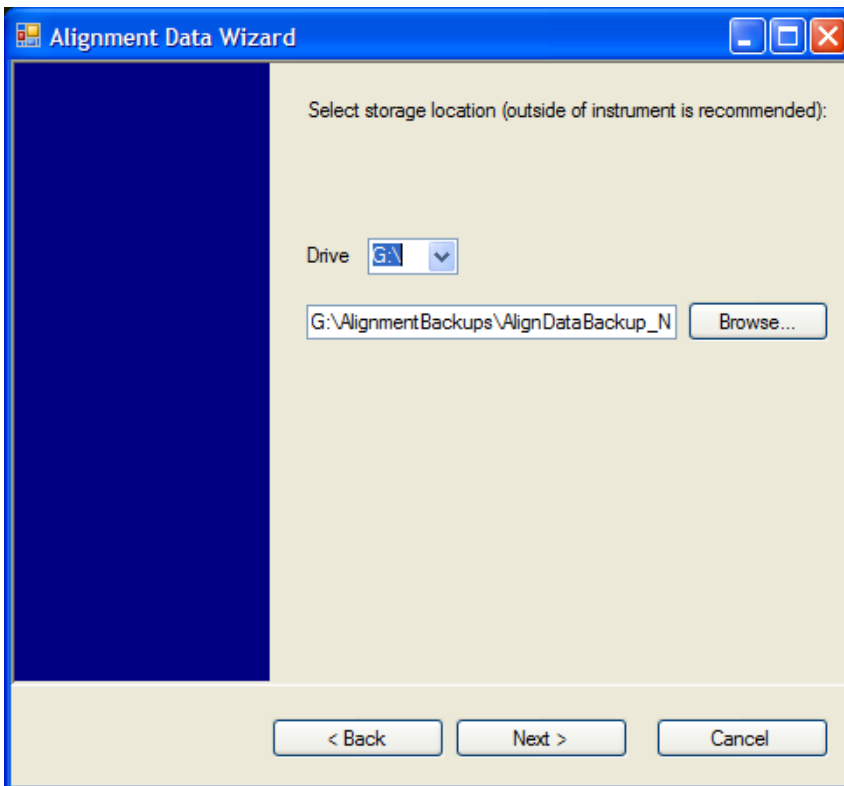
The following dialogue boxes operate without a mouse or external keyboard when you use the default file names.





The backup screen will indicate the approximate amount of space required to contain the backup file.

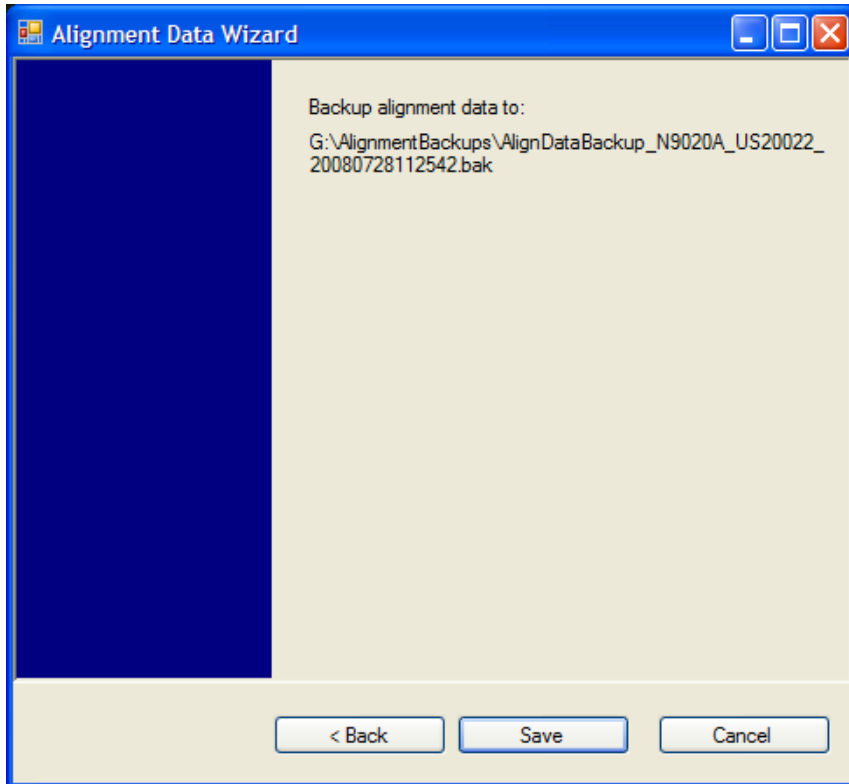
The default file name will be AlignDataBackup_<model number>_<serial number>_<date in YYYYMMDDHHMMSS>.bak.

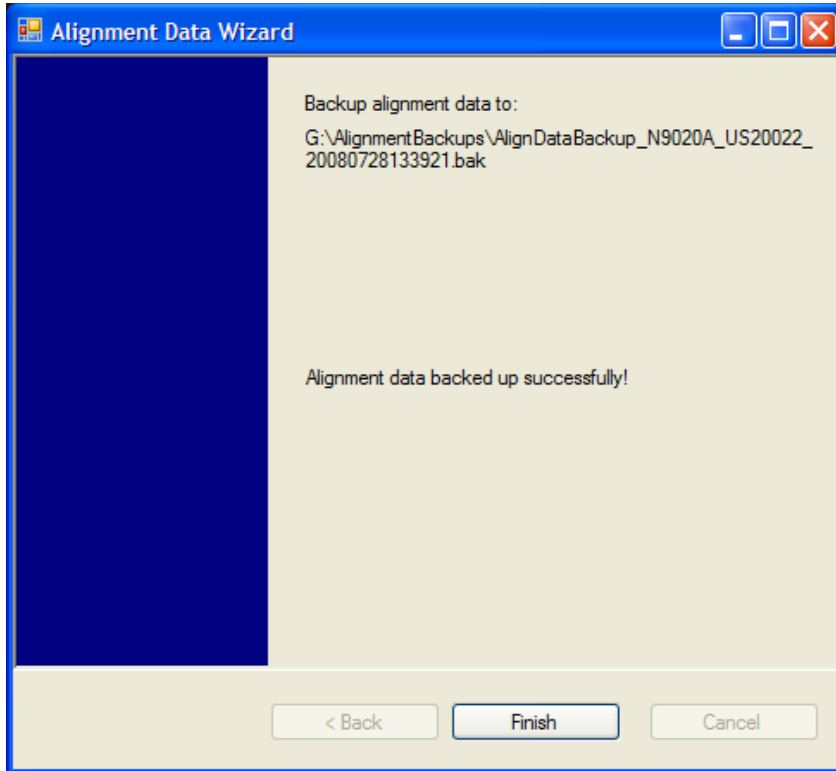


System Functions

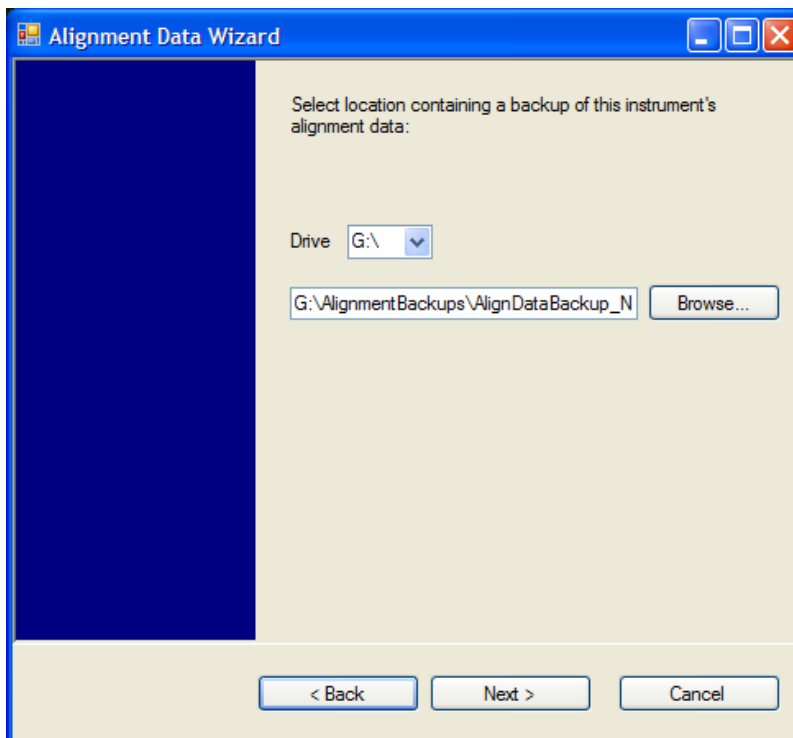
System

Changing the drive letter will also modify the path displayed in the box below. When this step is first loaded, the drive drop-down is populated with connected drives which provide s you with write access. If there are many unreachable network drives connected to the instrument, this step can take a few seconds. If a USB drive is present, it will be selected by default. The path defaults to the AlignmentBackups folder, and a filename will be automatically created in the form of AlignDataBackup_<model>_<serial number>_<date><time>. When the "Next >" button is pressed, you will be prompted to create a new folder if the chosen path does not yet exist.





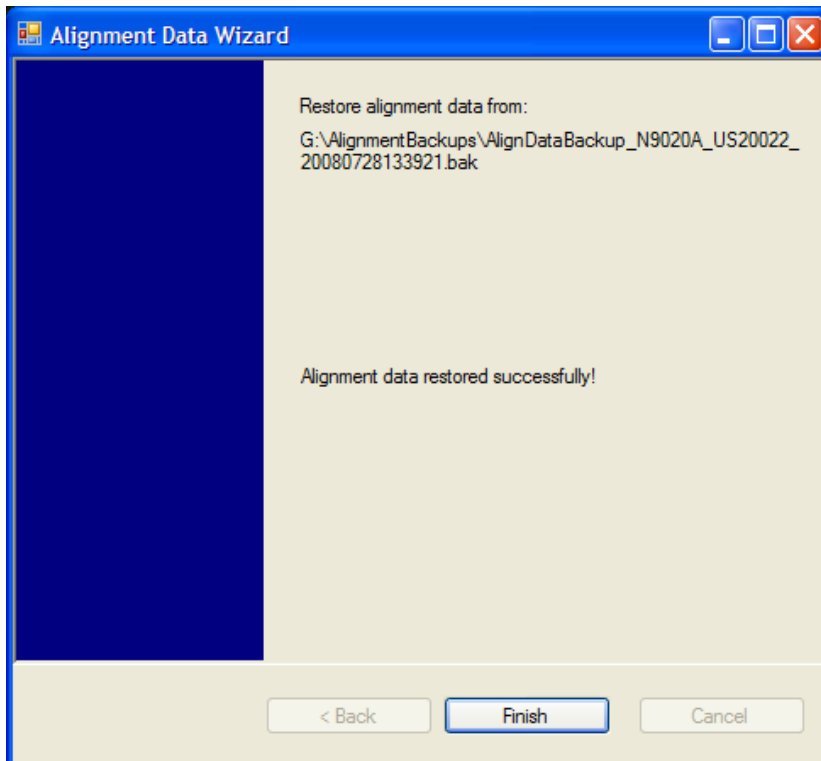
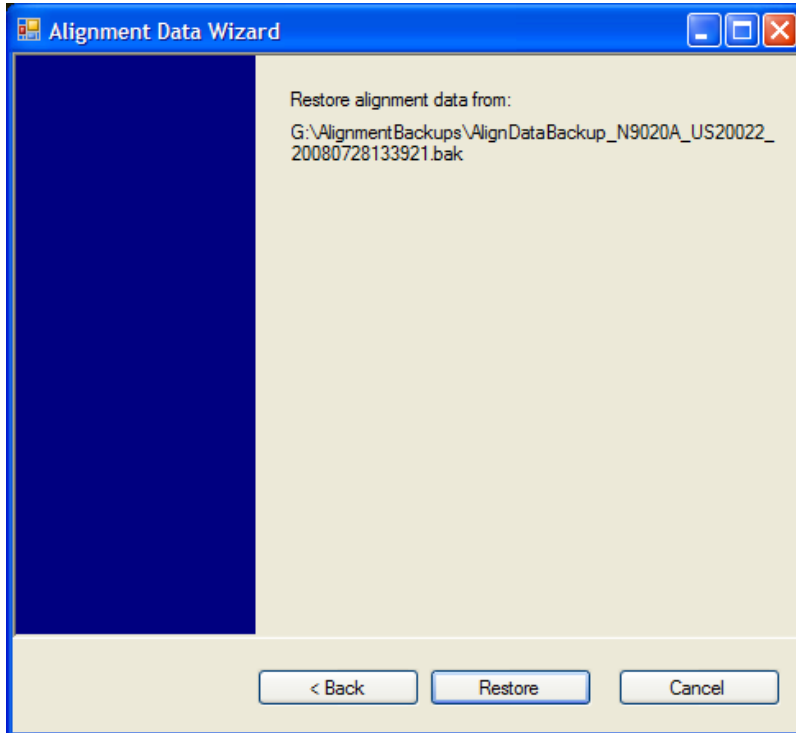
The restore operation will check the validity of the restore file using the database's built-in file validation. If the restore file is corrupt, the existing alignment data will remain in use.



Changing the drive letter will also modify the path displayed in the box below. When this step is first loaded, the

System Functions System

drive drop-down is populated with connected drives which provide you with read access. The path defaults to the AlignBackups folder. The most recent *.bak file in the folder will also be selected by default.



Perform Backup (Remote Command Only) Invokes an alignment data backup operation to the provided Folder.

NOTE It is recommended that the Folder provided is outside of the instrument (USB or Mapped Network Drive).

Remote Command: :CALibration:DATA:BACKup <filename>
 Example: :CAL:DATA:BACK
 "F:\AlignDataBackup_N9020A_US00000001_2008140100.bak"
 Instrument S/W Revision: A.02.00

Perform Restore (Remote Command Only) Invokes an alignment data restore operation from the provided filename.

Remote Command: :CALibration:DATA:REStore <filename>
 Example: :CAL:DATA:RESt "F:\
 AlignDataBackup_N9020A_US00000001_2008140100.bak "
 Instrument S/W Revision: A.02.00

I/O Config

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

Key Path **System**
 Instrument S/W Revision Prior to A.02.00

GPIB

Activates a menu for configuring the GPIB I/O port.

Key Path **System, I/O Config**
 Instrument S/W Revision A.02.00

GPIB Address Select the GPIB remote address.

Key Path **System, I/O Config, GPIB**
 Mode All
 Remote Command :SYSTem:COMMunicate:GPIB[1][:SELF]:ADDRess <integer>
 :SYSTem:COMMunicate:GPIB[1][:SELF]:ADDRess?
 Example :SYST:COMM:GPIB:ADDR 17
 Remote Command Notes NOTE: Changing the Address on the GPIB port requires all further communication to use the new address.

System Functions

System

| | |
|-------------------------|--|
| 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 | Prior to A.02.00 |

GPIB Controller Sets the GPIB port into controller or device mode. In the normal state, GPIB controller is disabled, which allows the analyzer to be controlled by a remote computer. When GPIB Controller is enabled, the instrument can run software applications that use the instrument's computer as a GPIB controller; controlling devices connected to the instrument's GPIB port.

NOTE When GPIB Controller is enabled, the analyzer application itself cannot be controlled over GPIB; however, in this case it can easily be controlled via LAN or USB. The GPIB port cannot be a controller and device at the same time. Additionally, only one controller can be active on the GPIB bus at any given time; if the analyzer is the controller an external PC cannot be a controller.

To control the instrument from the software that is performing GPIB controller operation, you can use an internal TCP/IP connection to the analyzer application. Use the address TCPIP0::localhost::inst0::INSTR to send SCPI commands to the analyzer application.

| | |
|-------------------------|--|
| Remote Command | :SYSTem:COMMunicate:GPIB[1][:SELF]:CONTroller[:ENABle] ON OFF 0 1 :SYSTem:COMMunicate:GPIB[1][:SELF]:CONTroller[:ENABle]? |
| Example | :SYST:COMM:GPIB:CONT ON Will set GPIB port to Controller |
| Key Path | System, I/O Config, GPIB |
| Mode | All |
| Scope | Mode Global |
| Notes | When the instrument becomes the Controller bit 0 in the Standard Event Status Register is set (and when the instrument relinquishes Controller capability bit 0 is cleared in the Standard Event Status Register). |
| Preset | This is unaffected by Preset but is set to OFF on a “Restore System Defaults->Misc” |
| State Saved | No |
| Range | Disabled Enabled |
| Instrument S/W Revision | A.02.00 |

Disabled Selection for disabling the GPIB Controller capability, this is the default (or normal) setting.

Key Path **System, I/O Config, GPIB, GPIB Controller**

| | | |
|-------------------------|--------------------------|------------------------------|
| Example | :SYST:COMM:GPIB:CONT OFF | Will set GPIB port to Device |
| Instrument S/W Revision | A.02.00 | |

Enabled Selection for enabling the GPIB Controller capability.

| | | |
|-------------------------|--|----------------------------------|
| Key Path | System, I/O Config, GPIB, GPIB Controller | |
| Example | :SYST:COMM:GPIB:CONT ON | Will set GPIB port to Controller |
| Instrument S/W Revision | A.02.00 | |

SCPI LAN

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 | Prior to A.02.00 |

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

| | |
|-------------------------|--|
| Key Path | System, I/O Config, SCPI LAN |
| Mode | All |
| Remote Command | :SYSTem:COMMunicate:LAN:SCPI:TELNet:ENABle OFF ON 0 1 :SYSTem:COMMunicate:LAN:SCPI:TELNet:ENABle? |
| Example | :SYST:COMM:LAN:SCPI:TELN:ENAB OFF |
| Preset | This is unaffected by Preset but is set to ON with a “Restore System Defaults->Misc” |
| State Saved | No |
| Range | On Off |
| Instrument S/W Revision | Prior to A.02.00 |

SCPI Socket Turns the capability of establishing Socket LAN sessions On or Off. This allows you to limit SCPI access over LAN through socket sessions.

| | |
|----------------|--|
| Key Path | System, I/O Config, SCPI LAN |
| Mode | All |
| Remote Command | :SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle OFF ON 0 1 :SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle? |

System Functions System

| | |
|-------------------------|--|
| Example | :SYST:COMM:LAN:SCPI:SOCK:ENAB OFF |
| Preset | This is unaffected by Preset but is set to ON with a “Restore System Defaults->Misc” |
| State Saved | No |
| Range | On Off |
| Instrument S/W Revision | Prior to A.02.00 |

SCPI Socket Control Port (remote command only) Returns the TCP/IP port number of the control socket associated with the SCPI socket session. This query enables you to obtain the unique port number to open when a device clear is to be sent to the instrument. Every time a connection is made to the SCPI socket, the instrument creates a peer control socket. The port number for this socket is random. You must use this command to obtain the port number of the control socket. To force a device clear on this socket, open the port and send the string “DCL” to the instrument.

If this SCPI command is sent to a non SCPI Socket interface, then 0 is returned.

| | |
|-------------------------|--|
| Mode | All |
| Remote Command | :SYSTem:COMMunicate:LAN:SCPI:SOCKet:CONTRol? |
| Example | :SYST:COMM:LAN:SCPI:SOCK:CONT? |
| Preset | This is unaffected by Preset or “Restore System Defaults->Misc”. |
| State Saved | No |
| Range | 0 to 65534 |
| Instrument S/W Revision | Prior to A.02.00 |

SICL Server Turns the SICL server capability On or Off, enabling you to limit SCPI access over LAN through the SICL server. (SICL IEEE 488.2 protocol.)

| Parameter | Description | Setting |
|----------------------------|---|---------|
| Maximum Connections | The maximum number of connections that can be accessed simultaneously | 5 |
| Instrument Name | The name (same as the remote SICL address) of your analyzer | inst0 |
| Instrument Logical Unit | The unique integer assigned to your analyzer when using SICL LAN | 8 |
| Emulated GPIB Name | The name (same as the remote SICL address) of the device used when communicating with your analyzer | gpib7 |
| Emulated GPIB Logical Unit | The unique integer assigned to your device when it is being controlled using SICL LAN | 8 |

| | | |
|-------------------------|--|----|
| Emulated GPIB Address | The emulated GPIB address assigned to your transmitter tester when it is a SICL server (the same as your GPIB address) | 18 |
| Key Path | System, I/O Config, SCPI LAN | |
| Mode | All | |
| Remote Command | :SYSTem:COMMunicate:LAN:SCPI:SICL:ENABle OFF ON 0 1 :SYSTem:COMMunicate:LAN:SCPI:SICL:ENABle? | |
| Example | :SYST:COMM:LAN:SCPI:SICL:ENAB OFF | |
| Preset | This is unaffected by Preset, but is set to ON with a “Restore System Defaults->Misc” | |
| State Saved | No | |
| Range | On Off | |
| Instrument S/W Revision | Prior to A.02.00 | |

Query USB Connection (Remote Command Only)

Enables you to determine the speed of USB connection.

| | | |
|-------------------------|--|--|
| Mode | All | |
| Remote Command | :SYSTem:COMMunicate:USB:CONNecion? | |
| Example | :SYST:COMM:USB:CONN? | |
| Remote Command Notes | <p>NONE – Indicates no USB connection has been made.</p> <p>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.</p> <p>HSPeed – Indicates that a USB high speed connection (480 Mbps) has been negotiated.</p> <p>FSPeed – Indicates that a USB full speed connection (12 Mbps) has been negotiated.</p> | |
| State Saved | No | |
| Range | NONE LSpeed HSPeed FSPeed | |
| Instrument S/W Revision | Prior to A.02.00 | |

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? | |

System Functions

System

| | |
|-------------------------|--|
| Example | :SYST:COMM:USB:STAT? |
| Remote Command Notes | <p>SUSPended – Indicates that the USB bus is currently in its suspended state. The bus is in the suspended state when:</p> <p>The bus is not connected to any controller</p> <p>The controller is currently powered off</p> <p>The controller has explicitly placed the USB device into the suspended state.</p> <p>When in the suspended state, no USB activity, including start of frame packets are received.</p> <p>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.</p> |
| State Saved | No |
| Range | SUSPended ACTive |
| Instrument S/W Revision | Prior to A.02.00 |

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? |
| Example | :SYST:COMM:USB:PACK? |
| Remote Command Notes | <p>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.</p> <p>The packet count is initialized to 0,0 when the instrument application is started.</p> |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |

LXI

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.

| | |
|-------------------------|---------------------------|
| Key Path | System, I/O Config |
| Instrument S/W Revision | Prior to A.02.00 |

LAN Reset This key resets the LAN connection.

| | |
|-------------------------|--------------------------------|
| Key Path | System, I/O Config, LXI |
| Instrument S/W Revision | Prior to A.02.00 |

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 239 “[Domain \(Remote Only\)](#)” on page 239).

| | |
|-------------------------|--|
| 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 | Prior to A.02.00 |

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, LXI |
| Instrument S/W Revision | Prior to A.02.00 |

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:EVEN:LAN:DIS:ALL |
| Instrument S/W Revision | Prior to A.02.00 |

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

System Functions

System

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.

| | |
|-------------------------|--|
| Key Path | System, I/O Config, LXI, LXI Output LAN Events |
| Remote Command | :LXI:EVENT[:OUTPut] :LAN:LIST? |
| Example | :LXI:EVEN: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” |
| 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 | Prior to A.02.00 |

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” |
| 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. |
| State Saved: | No |
| Range: | Uppercase, Lowercase, Numeric, Symbol except for comma or semicolon |
| Instrument S/W Revision: | Prior to A.02.00 |

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” |

| | |
|--------------------------|--|
| 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. |
| State Saved: | No |
| Range: | Uppercase, Lowercase, Numeric, Symbol |
| Instrument S/W Revision: | Prior to A.02.00 |

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: | Prior to A.02.00 |

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”

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- “LAN3”
- “LAN4”
- “LAN5”
- “LAN6”
- “LAN7”
-

| | |
|-------------------------|---|
| Key Path | System, I/O Config, LXI, LXI Output LAN Events, LAN[n] |
| Remote Command | :LXI:EVENT[:OUTPut]:LAN[:SET]:SOURCE "LANEVENT", "SourceEvent" :LXI:EVENT[:OUTPut]:LAN[:SET]:SOURCE? "LANEVENT" |
| Example | :LXI:EVEN:LAN:SOUR "LANEVENT";"WaitingForTrigger" |
| Restriction and Notes | The maximum length of the string is 45 characters. |
| 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 | Prior to A.02.00 |

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" |
| Restriction and Notes: | The maximum length of the string is 45 characters. |

| | |
|--------------------------|---|
| 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 |
| Instrument S/W Revision: | Prior to A.02.00 |

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:DRIV "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 | Prior to A.02.00 |

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 |

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| | | | |
|---|----------|----------|----------|
| 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:EVENT: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 | Prior to A.02.00 |

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:EVENT: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 | Prior to A.02.00 |

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 | Prior to A.02.00 |

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

| | |
|--------------------------|--------------------------------|
| Remote Command: | :LXI:EVENT[:OUTPut]:LAN:COUNT? |
| Example: | :LXI:EVEN:LAN:COUN? |
| Instrument S/W Revision: | Prior to A.02.00 |

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:EVEN:LAN:CONF "LAN0",1,"WaitingForTrigger",POS,NORM,"ALL" |
| Instrument S/W Revision: | Prior to A.02.00 |

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:EVEN:LAN:SEND "LANEVENT", FALL |
| Instrument S/W Revision: | Prior to A.02.00 |

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,

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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" |
| 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. |
| State Saved: | Saved in instrument state. |
| Range: | Uppercase, Lowercase, Numeric, Symbol |
| Instrument S/W Revision: | Prior to A.02.00 |

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 you to query the epoch time.

| | |
|--------------------------|---|
| Remote Command: | :LXI:CLOCK[:TIME][:VALUE] <seconds>,<fractionalSeconds> |
| Example: | :LXI:CLOC 10020304.0 s,0.123456 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. |
| 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 10 ³⁰ s (Max Double) Fraction: 0.0 s – 0.999999 s |
| Instrument S/W Revision: | Prior to A.02.00 |
| Remote Command: | :LXI:CLOCK[:TIME][:VALUE]? |
| Example: | :LXI:CLOC? |

| | |
|--------------------------|---|
| 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. |
| Preset: | System time |
| State Saved: | No |
| Range: | Seconds: 0.0 – 1.7976931348623157 x 10308 s (Max Double) Fraction: 0.0 s – 0.999999 s |
| Instrument S/W Revision: | Prior to A.02.00 |

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 you 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 |
| 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. |
| 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) |
| Instrument S/W Revision: | Prior to A.02.00 |

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 you 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 |
| Restriction and Notes: | Ignored when the device is not selected as the IEEE 1588 master clock. Only accurate to the microseconds position. |
| Preset: | Sub-second value of system time |

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State Saved: No
Range: [0.0,1.0)
Instrument S/W Revision: Prior to A.02.00

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: Prior to A.02.00

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: Prior to A.02.00

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: Prior to A.02.00

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: Prior to A.02.00

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
 Instrument S/W Revision: Prior to A.02.00

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: Prior to A.02.00

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: Prior to A.02.00

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

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

Instrument S/W Revision: Prior to A.02.00

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: Prior to A.02.00

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: Prior to A.02.00

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: Prior to A.02.00

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|US1000|US2500|MS10|MS25|MS100|MS1000|S10|GT10S|UNKNown
 :LXI:CLOCK:PTP:ACCuracy?
 Example: :LXI:CLOC:PTP:ACC US25
 Preset: Not affected by a Preset. The default value of "GT10S" can be restored by using the command:
 SYSTem:DEFault INPut
 Range: NS25|NS100|NS250|NS1000|NS2500|US10|US25|US100|US250|US1000|US2500|MS10|MS25|MS100|MS1000|S10|GT10S|UNKNown
 Instrument S/W Revision: Prior to A.02.00

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

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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

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

Range: 1|2|4|8|16

Instrument S/W Revision: Prior to A.02.00

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

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

Min: 2

Max: 10

Instrument S/W Revision: Prior to A.02.00

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?

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

Min: 6

Max: 248

Instrument S/W Revision: Prior to A.02.00

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: Prior to A.02.00

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
 Preset: Not affected by a Preset. The default value of "0" can be restored by using the command:
 SYSTem:DEFault INPut
 Min: 0
 Max: 127
 Instrument S/W Revision: Prior to A.02.00

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 x 10308 s (Min Double)
 Instrument S/W Revision: Prior to A.02.00

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
 Preset: Not affected by a Preset. The default value of "128" can be restored by using the command:
 SYSTem:DEFault INPut
 Min: 0
 Max: 255
 Instrument S/W Revision: Prior to A.02.00

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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 : CLOcK : PTP : PRI : SEC 50

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

Min: 0

Max: 255

Instrument S/W Revision: Prior to A.02.00

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 : CLOcK : PTP : STAT?

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

Instrument S/W Revision: Prior to A.02.00

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 : CLOcK : PTP : TRAC?

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

Instrument S/W Revision: Prior to A.02.00

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 : CLOcK : PTP : VAR?

Range: 0.0 – 1.7976931348623157 x 10308 (Max Double)

Instrument S/W Revision: Prior to A.02.00

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
 Preset: Not affected by a Preset. The default value of "1" can be restored by using the command:
 SYSTem : DEFault INPut
 Range: 0.0625s | 0.125s | 0.25s | 0.5s | 1s | 2s
 Instrument S/W Revision: Prior to A.02.00

Remote Command: : LXI : CLOCk : PTP : SINTerval?
 Example: : LXI : CLOC : PTP : SINT?
 Preset: 1
 Range: 0.0625s | 0.125s | 0.25s | 0.5s | 1s | 2s
 Instrument S/W Revision: Prior to A.02.00

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
 Preset: Not affected by a Preset. The default value of "8 s" can be restored by using the command:
 SYSTem : DEFault INPut
 Range: 1 s | 2 s | 4 s | 8 s | 16 s | 32 s
 Instrument S/W Revision: Prior to A.02.00

Remote Command: : LXI : CLOCk : PTP : DRINterval?
 Example: : LXI : CLOC : PTP : DRIN 15 ms
 Preset: 8 s
 Min: 0.0 s
 Max: 2³² = 4294967296 s
 Instrument S/W Revision: Prior to A.02.00

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: Prior to A.02.00

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

Remote Command: :LXI:CLOCK:PTP:GMASter:MADDDress?
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: Prior to A.02.00

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: Prior to A.02.00

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

Remote Command: :LXI:CLOCK:PTP:MASter:MADDDress?
Example: :LXI:CLOC:PTP:MASt:MADD?
Range: Uppercase, Lowercase, Numeric, Symbol
Instrument S/W Revision: Prior to A.02.00

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: Prior to A.02.00

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

Preset: Not affected by a Preset. The default value of "1" can be restored by using the command:

SYSTEM:DEFAULT INPUT

Range: ON|OFF|0|1

Instrument S/W Revision: Prior to A.02.00

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: Prior to A.02.00

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

Remote Command: :LXI:CLOCK:SALGORITHM:LOG:CLEAR

Example: :LXI:CLOC:SALG:LOG:CLEAR

Instrument S/W Revision: Prior to A.02.00

System Functions System

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: Prior to A.02.00

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
Preset: Not affected by a Preset. The default value of "0" can be restored by using the command:
SYSTem:DEFault INPut
Range: ON|OFF|0|1
Instrument S/W Revision: Prior to A.02.00

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
Preset: Not affected by a Preset. The default value of "256" can be restored by using the command:
SYSTem:DEFault INPut
Min: 0
Max: 1024
Instrument S/W Revision: Prior to A.02.00

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: Prior to A.02.00

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+038,0.000000000,0.000000000,0.000000000"

Range: Uppercase, Lowercase, Numeric, Symbol

Instrument S/W Revision: Prior to A.02.00

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: Prior to A.02.00

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: Prior to A.02.00

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

System Functions System

Preset: Not affected by a Preset. The default value of "0.0 s " can be restored by using the command:
SYSTem:DEFault INPut

Min: -1

Max: 1

Instrument S/W Revision: Prior to A.02.00

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

Preset: Not affected by a Preset. The default value of "1.0e-11 " can be restored by using the command:
SYSTem:DEFault INPut

Min: 0

Max: 1

Instrument S/W Revision: Prior to A.02.00

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

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

Min: 0

Max: 1

Instrument S/W Revision: Prior to A.02.00

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] : CIConstant <servoConstant>
 : LXI : CLOcK : SALGorithm [: SET] : CIConstant?

Example: : LXI : CLOcK : SALG : CIC 0.5

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

Min: 0

Max: 1

Instrument S/W Revision: Prior to A.02.00

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 : CLOcK : SALG : FPC 1

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

Min: 0

Max: 1

Instrument S/W Revision: Prior to A.02.00

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?

System Functions

System

Example: :LXI:CLOC:SALG:FIC 0.6

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

Min: 0

Max: 1

Instrument S/W Revision: Prior to A.02.00

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

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

Min: 0

Max: 25

Instrument S/W Revision: Prior to A.02.00

Outlier Threshold (Remote Only) Defines the threshold for determining whether a packet is considered a statistical outlier. If a sync or delay request is held up in a switch for a significant amount of time, the quality of synchronization will be perturbed. The servo ignores anything outside the outlier threshold. This parameter is expressed as a number of standard deviations from the currently measured average packet latency. Note that the value can be set to fractional standard deviations.

Remote Command: :LXI:CLOCK:SALGorithm[:SET]:OTHReshold
<standardDeviations>
:LXI:CLOCK:SALGorithm[:SET]:OTHReshold?

Example: :LXI:CLOC:SALG:OTHR 1.0

Preset: Not affected by a Preset. The default value of "5.0" can be restored by using the command:
SYSTem:DEFault INPut

Min: 0.25

Max: 6.0

Instrument S/W Revision: Prior to A.02.00

Outlier Threshold Enable (Remote Only) Enables the outlier threshold to determine whether or not outliers are discarded.

Remote Command: : LXI: CLOCk: SALGorithm[: SET]: OTENable ON|OFF|1|0
 : LXI: CLOCk: SALGorithm[: SET]: OTENable?

Example: : LXI: CLOC: SALG: OTEN OFF

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

Instrument S/W Revision: Prior to A.02.00

Set/Steer Threshold (Remote Only) If the instrument's clock deviates from the master by an amount equal to or greater than this threshold, it is reset to match the master rather than being gradually steered toward it.

Remote Command: : LXI: CLOCk: SALGorithm[: SET]: STHReshold <seconds>
 : LXI: CLOCk: SALGorithm[: SET]: STHReshold?

Example: : LXI: CLOC: SALG: STHR 15 ms

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

Min: 0.0001

Max: 10.0

Instrument S/W Revision: Prior to A.02.00

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: Prior to A.02.00

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

System Functions System

Instrument S/W Revision: Prior to A.02.00

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

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

SYSTem:DEFault INPut

Range: ON|OFF|0|1

Instrument S/W Revision: Prior to A.02.00

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

Preset: Not affected by a Preset. The default value of "60" can be restored by using the command:

SYSTem:DEFault INPut

Min: 0

Max: 3600

Instrument S/W Revision: Prior to A.02.00

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:EVEN: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: Prior to A.02.00

Remote Command: :LXI:EVENT:STATus[:ENABled]? "STATUSEVENT"
 Example: :LXI:EVEN: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: Prior to A.02.00

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"
 Restriction and Notes: The maximum length of the string is 512 characters.
 State Saved: Saved in instrument state.
 Range: Uppercase, Lowercase, Numeric, Symbol
 Instrument S/W Revision: Prior to A.02.00

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
 Restriction and Notes: The maximum length of the string is 512 characters.
 State Saved: Saved in instrument state.
 Range: Uppercase, Lowercase, Numeric, Symbol
 Instrument S/W Revision: Prior to A.02.00

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

System Functions System

Instrument S/W Revision: Prior to A.02.00

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"

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.

State Saved: No

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

Instrument S/W Revision: Prior to A.02.00

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"

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.

State Saved: No

Range: Uppercase, Lowercase, Numeric, Symbol

Instrument S/W Revision: Prior to A.02.00

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:EVENT: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: | Prior to A.02.00 |

Filter (Remote Only) Only LXI Input LAN Events coming from hosts matching the filter string are processed. There is no Key Path 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:EVENT:INP:LAN:FILT "LAN0", "agilent.com" :LXI:EVENT:INP:LAN:FILT? |
| Restriction and Notes: | The maximum length of the string is 45 characters. Nothing happens if the LAN event does not exist. |
| State Saved: | Saved in instrument state. |
| Range: | Uppercase, Lowercase, Numeric, Symbol |
| Instrument S/W Revision: | Prior to A.02.00 |

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:EVENT:INP:LAN:IDEN "LAN0", "debugstring" |

System Functions

System

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| 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. |
| State Saved: | Saved in instrument state. |
| Range: | Uppercase, Lowercase, Numeric, Symbol |
| Instrument S/W Revision: | Prior to A.02.00 |

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 |
| Restriction and Notes: | If a non existent LAN event is passed in the lanEvent argument, the command is ignored |
| 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 |
| Instrument S/W Revision: | Prior to A.02.00 |

| | |
|--------------------------|--|
| Remote Command: | :LXI:EVENT:INPut:LAN[:SET]:DETection? "LANEVENT" |
| Example: | :LXI:EVENT:INP:LAN:DET? "LANEVENT" |
| Restriction and Notes: | If a non existent LAN event is passed in the lanEvent argument, the command is ignored |
| Preset: | HIGH |
| State Saved: | Saved in instrument state. |
| Range: | HIGH LOW RISE FALL |
| Instrument S/W Revision: | Prior to A.02.00 |

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 : EVEN : 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: Prior to A.02.00

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: Prior to A.02.00

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: Prior to A.02.00

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: Prior to A.02.00

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

System Functions System

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: Prior to A.02.00

Restore Defaults

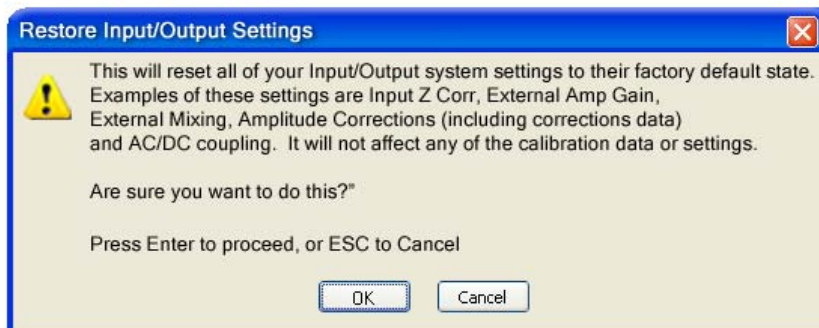
Provides incremental initialization of the system setting groups along with supporting a comprehensive reset of the entire instrument back to a factory default state. The menu selections are the groups of system settings and when one is selected, that particular group of system settings is reset back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

| | |
|-------------------------|---|
| Key Path | System |
| Mode | All |
| Remote Command | : SYSTem:DEFault [ALL] ALIGn INPut MISC MODes PON |
| Example | SYST:DEF |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |

Restore Input/Output Defaults

Causes the group of settings and data associated with Input/Output front-panel key to be a reset to their default values. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch.

Confirmation is required to restore the Input/Output setting. The confirmation dialog is:



| | |
|----------|--|
| Key Path | System, Restore System Defaults |
|----------|--|

| | |
|---------|---------------|
| Example | :SYST:DEF INP |
|---------|---------------|

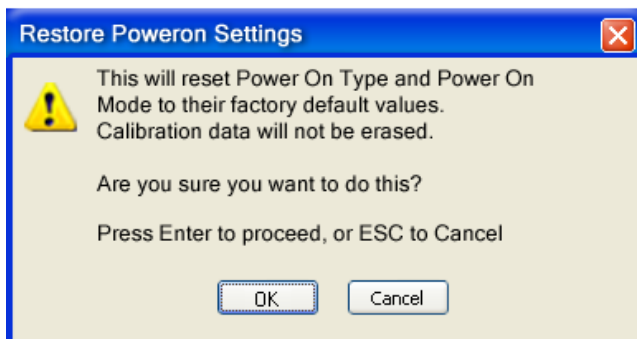
Instrument S/W Revision

Prior to A.02.00

Restore Power On Defaults

This selection causes the Power On settings to be a reset to their default value. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch. The Power On settings and their default values are Power On Type reset to Mode and Input/Output Defaults and Power On Application reset to whatever the factory set as its default value.

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



Key Path

System, Restore System Defaults

Example

:SYST:DEF PON

Instrument S/W Revision

Prior to A.02.00

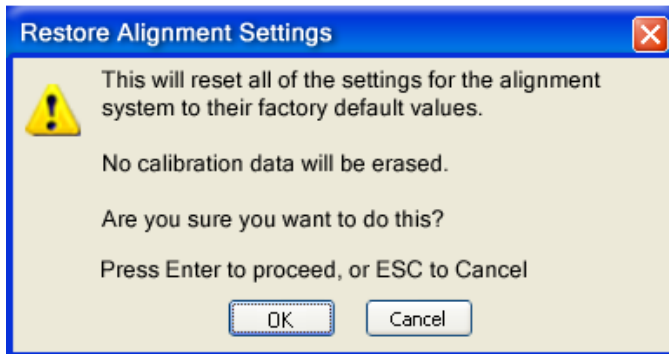
Restore Align Defaults

This selection causes the Alignment system settings to be a reset to their default values. This does not affect any Alignment data stored in the system. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch.

After performing this function, it may impact the auto-alignment time of the instrument until a new alignment baseline has been established.

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

System Functions System



| | |
|-------------------------|--|
| Key Path | System, Restore System Defaults |
| Example | :SYST:DEF ALIG |
| Instrument S/W Revision | Prior to A.02.00 |

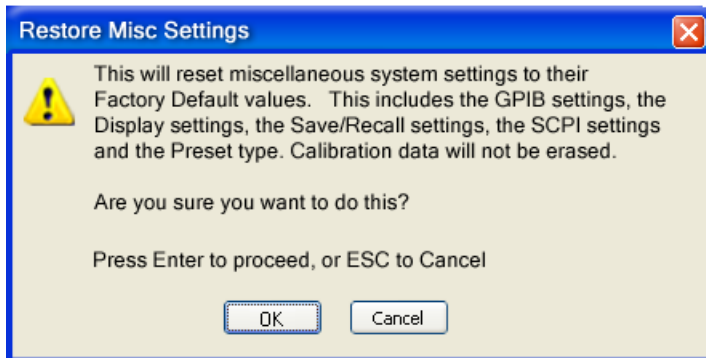
Restore Misc Defaults

This selection causes miscellaneous system settings to be reset to their default values. With this reset, you lose the GPIB address and it is reset to 18, so this should be used with caution. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch. This miscellaneous group contains the rest of the settings that have not been part of the other Restore System Defaults groups. The following table is a complete list of settings associated with this group:

| Miscellaneous Setting | Default Value |
|-----------------------|---------------|
| Verbose SCPI | Off |
| 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:

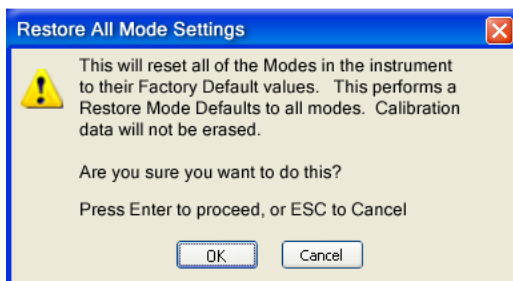


| | |
|-------------------------|--|
| Key Path | System, Restore System Defaults |
| Example | :SYST:DEF MISC |
| Instrument S/W Revision | Prior to A.02.00 |

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:



System Functions

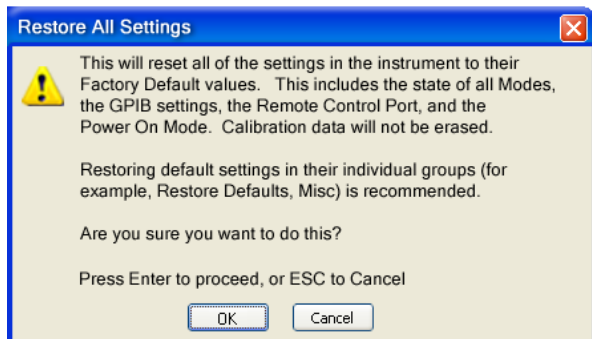
System

| | |
|-------------------------|--|
| Key Path | System, Restore System Defaults |
| Example | :SYST:DEF MOD |
| 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. |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Example | :SYST:DEF ALL |
| 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. |
| Instrument S/W Revision | Prior to A.02.00 |

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 Prior to A.02.00

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 Prior to A.02.00

There are five remote commands available for licensing.

Remote Command: :SYSTem:LKEY <"OptionInfo">, <"LicenseInfo">
Example: SYST:LKEY
 "N9073A-1FP","027253AD27F83CDA5673A9BA5F427FDA5E4F25AEB1
 017638211AC9F60D9C639FE539735909C551DE0A91"
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, since the system knows which version is supported
 for each feature.
 The <"LicenseInfo"> contains the signature, the expiration date, and serial
 number for transport if transportable. You must specify the signature, but you
 can omit the other information. If you omit the expiration date, the system
 regards it as permanent. If you omit the serial number, the system regards it as
 non-transportable. As a result, this supports backward compatibility.
Instrument S/W Revision: Prior to A.02.00
Remote Command: :SYSTem:LKEY:DELeTe <"OptionInfo">,<"LicenseInfo">
Example: SYST:LKEY:DEL
 "N9073A-1FP","027253AD27F83CDA5673A9BA5F427FDA5E4F25AEB1
 017638211AC9F60D9C639FE539735909C551DE0A91"
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, if more than one version is installed.
 The <"LicenseInfo"> contains the signature, the expiration date, and whether
 or not be transportable. You must specify the signature, but you can omit the
 other information. If you omit the expiration date, the system regards it as
 permanent. If you omit the transportability, the system regards it as
 non-transportable. As a result, this supports backward compatibility.
Instrument S/W Revision: Prior to A.02.00

System Functions

System

| | |
|--------------------------|--|
| Remote Command: | :SYSTem:LKEY:LIST? |
| Remote Command Notes: | <p>Return Value:</p> <p>An <arbitrary block data> of all the installed instrument licenses.</p> <p>The format of each license is as follows.</p> <p><Feature>,<Version>,<Signature>,<Expiration Date>,<Serial Number for Transport></p> <p>Return Value Example:</p> <p>#3136</p> <p>N9073A-1FP,1.000,B043920A51CA</p> <p>N9060A-2FP,1.000,4D1D1164BE64</p> <p>N9020A-508,1.000,389BC042F920</p> <p>N9073A-1F1,1.000,5D71E9BA814C,13-aug-2005</p> <p><arbitrary block data> is:</p> <p>#NMMM<data></p> <p>Where:</p> <p>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.</p> <p>MMM would be the ASCII representation of the number of bytes. In the previous example, N would be 55.</p> <p><data> ASCII contents of the data</p> |
| Instrument S/W Revision: | Prior to A.02.00 |
| Remote Command: | :SYSTem:LKEY? <"OptionInfo"> |
| Example: | SYST:LKEY? "N9073A-1FP" |
| 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.</p> <p>Return Value:</p> <p><"LicenseInfo"> if the license is valid, null otherwise.</p> <p><"LicenseInfo"> contains the signature, the expiration date, and serial number if transportable.</p> <p>Return Value Example:</p> <p>"B043920A51CA"</p> |
| Instrument S/W Revision: | Prior to A.02.00 |
| Remote Command: | :SYSTem:HID? |
| Remote Command Notes: | Return value is the host ID as a string |

Instrument S/W Revision: Prior to A.02.00

Agilent Upgrade Service

The Agilent Upgrade Service entitles an instrument to software enhancements, if and when they occur, for the duration of the service period. Beginning in September, 2008, all new X-Series instruments will contain 2 years of upgrade service included with the purchase of the instrument. The Agilent Upgrade Service will be option AUS on the N9010A or N9020A. For new instrument purchases the two year entitlement will be from date of manufacture (plus one month for transit and receiving).

The Agilent Upgrade Service is administered via a license which carries the end date of the upgrade entitlement. The license can be viewed in Agilent License Manager, or via the Show System screen.

The Agilent Upgrade Service is for an individual instrument, it cannot be transferred from one instrument to another.

For existing instruments that do not have the Agilent Upgrade Service, or for extending the upgrade service after it has expired, the Agilent Upgrade Service is available as a standalone upgrade product. The two year entitlement will be from the date of redemption of the license.

Agilent Upgrade Service - software update installation

When a software update is being performed on an instrument, the installer will determine if the instrument has a valid Agilent Upgrade Service for the revision of software that is being installed. If the Agilent Upgrade Service is valid, the installation proceeds unencumbered. If the service is not valid, the operator is provided a prompt to contact Agilent for purchasing an Agilent Upgrade Service and the software update is not performed.

Agilent Upgrade Service - software removal

When a software update is being removed from instrument via Add/Remove Programs, the uninstall will check if there is an AUS license with date remaining on the service. If the AUS is expired, the operator will be given a prompt warning that an AUS Renewal may be required to install newer software and how to contact Agilent to obtain the renewal. The operator can choose to proceed with uninstall or terminate at which no software will be removed or altered.

Agilent Upgrade Service - viewing end-of-service date

There are two methods for viewing the end-of-service date of the Agilent Upgrade Service. The first is to use the Show System screen in the instrument application System -> Show -> System. The second is to use the Agilent License Manager. The Agilent License Manager can be invoked from the System menu of the instrument application or by right-mouse clicking on the License Notifier icon in the Windows® task tray.

Agilent Upgrade Service - Listing end-of-service date (Remote command only) The end-of-service date for the Agilent Upgrade Service can be queried via SCPI.

Remote Command: :SYSTem:AUService:DATE?

Example: :SYST:AUS:DATE?

System Functions System

Notes: If there is no Agilent Upgrade Service license installed the date will return "01-sep-2008"

Instrument S/W Revision: A.02.00

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 Prior to A.02.00

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 Prior to A.02.00

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.

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

| | |
|-------------------------|---|
| Key Path | System, Diagnostics |
| Mode | All |
| 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. |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|-----------------------|-----------------------|
| Remote Command: | :SYSTem:MRELay:COUNT? |
| Example: | :SYST:MREL:COUN? |
| Remote Command Notes: | Query Only |

System Functions System

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>”

Instrument S/W Revision: Prior to A.02.00

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?

Example :SYST:TEMP:LEXT?

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

State Saved No

Instrument S/W Revision Prior to A.02.00

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?

Example :SYST:TEMP:HEXT?

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

State Saved No

Instrument S/W Revision Prior to A.02.00

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

Remote Command: :SYSTem:PON:ETIMe?

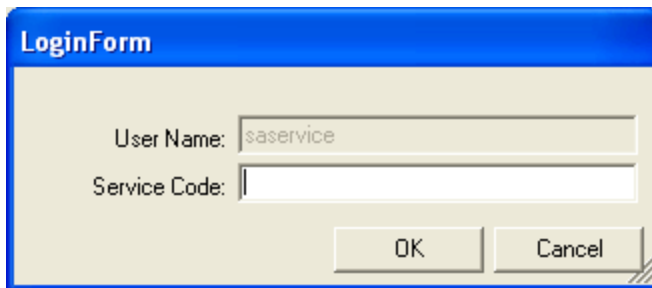
Example: :SYST:PON:ETIM?

Remote Command Notes: Query Only

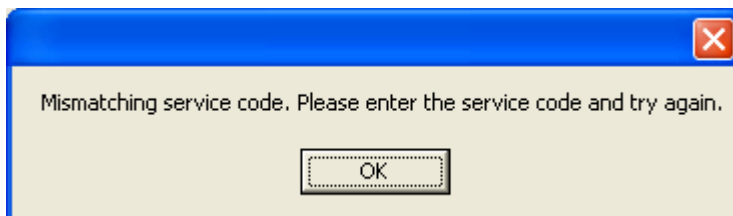
Instrument S/W Revision: Prior to A.02.00

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 you are provided the following dialog:



| | |
|-------------------------|--|
| Key Path | System, Diagnostics |
| Restriction and Notes | Password is required to access this menu. |
| Instrument S/W Revision | Prior to A.02.00 |

List installed Options (Remote Command Only)

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

| | |
|-----------------------|---|
| Mode | All |
| Remote Command | :SYSTem:OPTions? |
| Example | :SYST:OPT? |
| 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 |

Instrument S/W Revision Prior to A.02.00

Lock the Front-panel keys (Remote Command Only)

Disables the instrument keyboard to prevent local input when the instrument is controlled remotely. Annunciation showing a “K” for ‘Klock’ (keyboard lock) alerts the local user that the keyboard is locked. Klock is similar to the GPIB Local Lockout function; namely that no front-panel keys are active with the exception of the Power Standby key. (The instrument is allowed to be turned-off if Klock is ON.) The Klock command is used in remote control situations where Local Lockout cannot be used.

Although primary intent of Klock is to lock-out the front panel, it will lock-out externally connected keyboards through USB. Klock has no effect on externally connected pointing devices (mice).

The front panel ‘Local’ key (Cancel/Esc) has no effect if Klock is ON.

| | |
|-------------------------|--|
| Mode | All |
| Remote Command | :SYSTem:KLOCK OFF ON 0 1 :SYSTem:KLOCK? |
| Example | :SYST:KLOC ON |
| Remote Command Notes | Keyboard lock remains in effect until turned-off or the instrument is power-cycled |
| Preset | Initialized to OFF at startup, unaffected by Preset |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |

List SCPI Commands (Remote Command Only)

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

| | |
|--------------------------|---|
| Remote Command: | :SYSTem:HELP:HEADers? |
| Example: | :SYST:HELP:HEAD? |
| Remote Command Notes: | The output is an IEEE Block format with each command separated with the New-Line character (hex 0x0A) |
| Instrument S/W Revision: | Prior to A.02.00 |

SCPI Version Query (Remote Command Only)

Returns the SCPI version number with which the instrument complies. The SCPI industry standard changes regularly. This command indicates the version used when the instrument SCPI commands were defined.

| | |
|-----------------|------------------|
| Remote Command: | :SYSTem:VERSion? |
|-----------------|------------------|

Example: :SYST:VERS?
Instrument S/W Revision: Prior to A.02.00

Date (Remote Command Only)

The recommended access to the Date, Time, and Time zone of the instrument is through the Windows native control (Control Panel or accessing the Task Bar). You may also access this information remotely, as shown in this command and Time (below).

Sets or queries the date in the instrument.

| | |
|-------------------------|--|
| Mode | All |
| Remote Command | :SYSTem:DATE "<year> , <month> , <day>" :SYSTem:DATE? |
| Example | :SYST:DATE "2006,05,26" |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |

Time (Remote Command Only)

Sets or queries the time in the instrument.

| | |
|-------------------------|--|
| Mode | All |
| Remote Command | :SYSTem:TIME "<hour> , <minute> , <second>" :SYSTem:TIME? |
| Example | :SYST:TIME "13,05,26" |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |

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.

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

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 |
| Example | :SYST:PRES:USER:SAVE :SYST:PRES:USER |
| Remote Command Notes | :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. |
| Restriction and Notes | Clears all pending OPC bits. The Status Byte is set to 0. |
| 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. |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Example | :SYST:PRES:USER:SAVE :SYST:PRES:USER:ALL |
| Remote Command Notes | :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. |

System Functions

User Preset

| | |
|-------------------------|--|
| Restriction and Notes | Clears all pending OPC bits. The Status Byte is set to 0. |
| 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. |
| Instrument S/W Revision | Prior to A.02.00 |

Save User Preset

Save User Preset saves the currently active mode and its state. The way you recall 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 |
| Example | :SYST:PRES:USER:SAVE |
| Restriction and Notes | :SYST:PRES:SAVE creates the same file as if you requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow you to specify the filename or the location of the file. |
| Instrument S/W Revision | Prior to A.02.00 |

The Vector Analysis measurement is accessed from the Meas hardkey. The Vector Analysis measurement bases its results on a set of periodic time samples of a channel. The channel is defined by a combined bank of hardware and DSP filters whose overall frequency response has a flat top and steep rolloff at the band edges. The time record is operated upon by a number of mathematical functions, including the FFT to produce spectrum results and statistical functions, including complementary cumulative distribution function (CCDF). Any of these results may be displayed in a flexible layout, with the Y data formatted in a variety of ways, and results scaled as desired. Many of these analysis results are also available in optional VSA demodulation measurements.

This topic contains the following section:

[“Measurement Commands for Vector Analysis Measurement” on page 273](#)

Measurement Commands for Vector Analysis Measurement

The Vector Analysis measurement is invoked remotely by the following:

```
:CONFigure:VECTor
```

```
:CONFigure:VECTor:NDEFault
```

Remote results may be obtained using the following:

```
:FETCh:VECTor[n]?
```

Only table results may be obtained using FETCh. The tables available for the Vector Analysis measurement are ACP and OccBW tables, which are available to any VSA measurement.

```
:INITiate:VECTor
```

```
:READ:VECTor[n]?
```

NOTE: The MEASure? command is not supported by the Vector Analysis measurement.

| | |
|--------------------------|------------------|
| Key Path: | Meas |
| Mode: | VSA, IDEN |
| Instrument S/W Revision: | Prior to A.02.00 |

AMPTD Y Scale

This key accesses a menu that allows you to select amplitude or Y-scale parameters for the current measurement.

For more information see [“AMPTD Y Scale \(Amplitude\)”](#) on page 746.

| | |
|--------------------------|--------------------|
| Key Path: | Front Panel |
| Mode: | VSA, IDEN |
| Instrument S/W Revision: | Prior to A.02.00 |

Auto Couple

The Auto Couple key forces all Auto / Man functions into Auto. These include the following functions. Other measurement specific functions will be listed in their individual PDs. Note that this key does not invoke the Auto tune function, nor does it cause any Y autoscaling or Input Auto ranging.

- Frequency Step
- X Scale
- Y Axis Unit Preference
- Frequency Points

| | |
|--------------------------|--------------------|
| Key Path: | Front Panel |
| Mode: | VSA, IDEN |
| Instrument S/W Revision: | Prior to A.02.00 |

BW

The BW key provides access to a menu that allows you to set available resolution bandwidth parameters for 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, IDEN |
| Instrument S/W Revision: | Prior to A.02.00 |

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.

| | |
|--------------------------|--------------------|
| Key Path: | Front Panel |
| Mode: | VSA, IDEN |
| Instrument S/W Revision: | Prior to A.02.00 |

Marker

The Marker key accesses 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 may also be used in pairs to read the difference (or delta) between two data points. They can also be used to make power calculation 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.

| | |
|--------------------------|--------------------|
| Key Path: | Front Panel |
| Mode: | VSA, IDEN |
| Instrument S/W Revision: | Prior to A.02.00 |

Marker Function

This key provides access to a menu that allows you to select marker functions for the current measurement.

| | |
|--------------------------|--------------------|
| Key Path: | Front Panel |
| Mode: | VSA, IDEN |
| Instrument S/W Revision: | Prior to A.02.00 |

Marker To

This key provides access to a menu that allows you to select where to move the marker.

| | |
|--------------------------|--------------------|
| Key Path: | Front Panel |
| Mode: | VSA, IDEN |
| Instrument S/W Revision: | Prior to A.02.00 |

Meas Setup

This key accesses a menu of keys that select measurement functions for the current VSA Measurement.

| | |
|--------------------------|--------------------|
| Key Path: | Front Panel |
| Mode: | VSA, IDEN |
| Instrument S/W Revision: | Prior to A.02.00 |

Output

This key provides access to a menu that allows you to select input/output parameters for the measurement data.

| | |
|--------------------------|--------------------|
| Key Path: | Front Panel |
| Mode: | VSA, IDEN |
| Instrument S/W Revision: | Prior to A.02.00 |

Peak Search

This key initiates an immediate search for the peak level signal and places a marker at that data point.

| | |
|--------------------------|--------------------|
| Key Path: | Front Panel |
| Mode: | VSA, IDEN |
| Instrument S/W Revision: | Prior to A.02.00 |

Source

There are no selectable Source parameters for this measurement.

| | |
|--------------------------|--------------------|
| Key Path: | Front Panel |
| Mode: | VSA, IDEN |
| Instrument S/W Revision: | Prior to A.02.00 |

SPAN X Scale

This key provides access to a menu that allows you to select span or X-scale parameters for the current measurement.

| | |
|--------------------------|--------------------|
| Key Path: | Front Panel |
| Mode: | VSA, IDEN |
| Instrument S/W Revision: | Prior to A.02.00 |

Sweep/Control

This key accesses a menu that allows you to select Sweep/Control parameters for all VSA measurements.

| | |
|--------------------------|--------------------|
| Key Path: | Front Panel |
| Mode: | VSA, IDEN |
| Instrument S/W Revision: | Prior to A.02.00 |

Trace/Detector

This section details the trace results accessible via the data key and also via SCPI, many of which are available in other measurements as well.

For more information see [“Trace/Detector” on page 809](#).

Key Path: **Front Panel**
 Mode: VSA, IDEN
 Instrument S/W Revision: Prior to A.02.00

Data

This key provides a menu of trace data choices for the selected trace. For the SCPI command, and other details, see Trace/Detector, Data

The following trace data results are available:

| Trace data key name | SCPI string form | Description |
|------------------------------|-------------------|--|
| Spectrum | "Spectrum1" | Averaged result of successive Inst Spectrum results (If RMS or Max averaging is on). Otherwise, FFT of current windowed Main (or Gate) Time |
| Inst Spectrum | "Inst Spec1" | Instantaneous Spectrum is the FFT of the current windowed Main (or Gate) Time. It is instantaneous in the sense that it isn't rms averaged, but it may included time-averaged data. |
| Main Time | "Main Time1" | Same as Inst Main Time unless Time averaging is on, in which case it is the averaged result of successive Inst Main Time results. If Time Gating is on, Main Time is the source to which the Gate is applied. |
| Inst Main Time | "Inst Main Time1" | Instantaneous Main Time is the current corrected, resampled, time record. |
| Gate Time | "Gate Time1" | Gate Time replaces Main Time as input to results if gating is on. |
| Raw Main Time | "Raw Main Time1" | Time record as it comes from the hardware, before software resampling or corrections |
| Power Spectral Density (PSD) | "PSD1" | Power spectrum divided by ResBW |
| CCDF | "CCDF1" | Complementary Cumulative Distribution Function of all time date since last measurement restart |
| CDF | "CDF1" | Cumulative Distribution Function of all time date since last measurement restart |

Vector Analysis Measurement
Trace/Detector

| Trace data key name | SCPI string form | Description |
|---------------------|--------------------|--|
| PDF | "PDF1" | Probability Distribution Function of all time data since last measurement restart |
| Auto Correlation | "Auto Correl1" | Autocorrelation function of the current Main (or Gate) Time result |
| OBW Summary Trace 1 | "OBW Summary Trc1" | Table of Occupied Bandwidth results if OccBW is enabled on Trace 1 and Trace 1 has Spectrum or PSD data. Similar summaries are available for all traces. |
| ACP Summary Trace 1 | "ACP Summary Trc1" | Table of Adjacent Channel Power results if ACP is enabled on Trace 1 and Trace 1 has Spectrum or PSD data. Similar summaries are available for all traces. |
| No Data | "No Data" | An empty trace |

For more information see ["Data" on page 811](#).

Key Path: **Trace/Detector**
 Mode: VSA, IDEN
 Instrument S/W Revision: Prior to A.02.00

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 pretrigger data to be taken. Each trigger source has associated its own trigger level, slope, and delay settings.

| | |
|--------------------------|--------------------|
| Key Path: | Front Panel |
| Mode: | VSA, IDEN |
| Instrument S/W Revision: | Prior to A.02.00 |

View/Display

The View/Display key provides access to a menu that enable you to select display parameters for the current measurement.

For more information on other View/Display functions (Display and Layout) see Analyzer Setup, View/Display

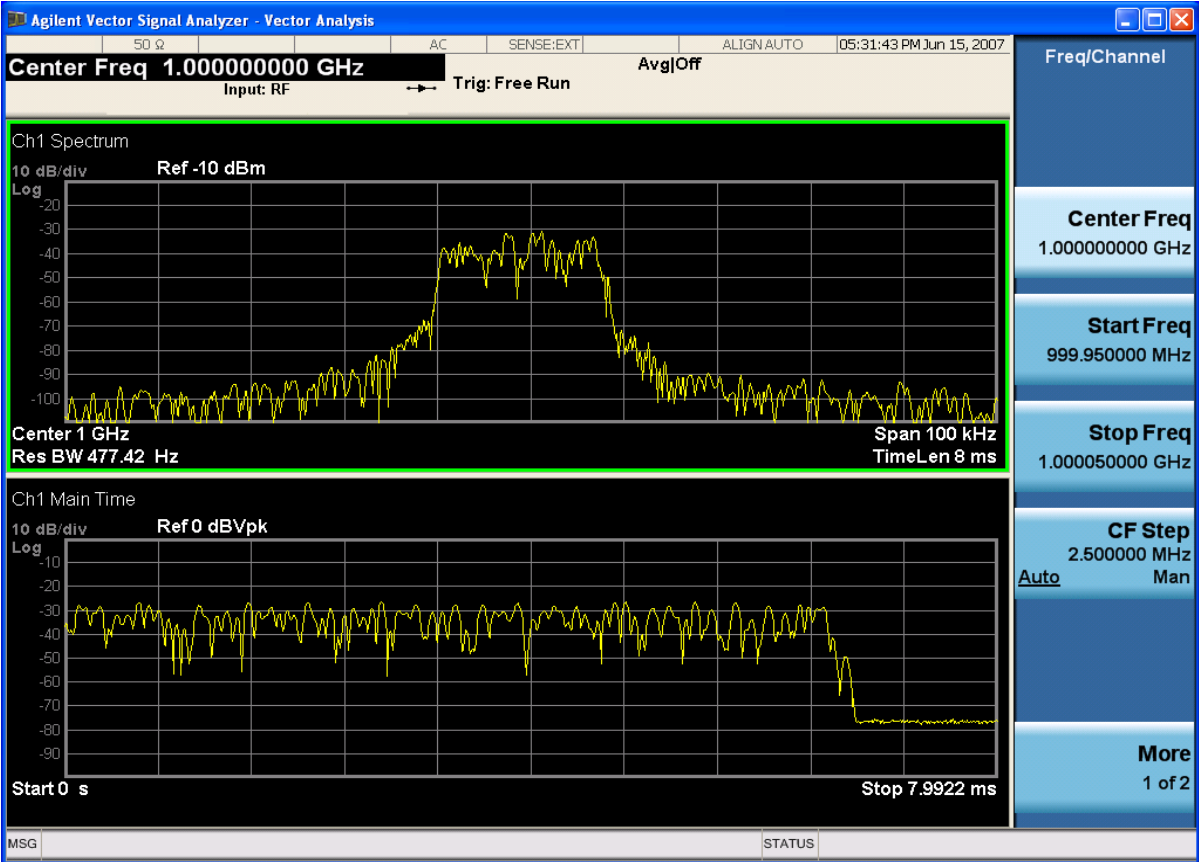
View Presets affect the trace layout, trace data assignment, scaling and formatting but do not affect hardware measurement setup.

| | |
|--------------------------|--|
| Key Path: | Front Panel |
| Mode: | VSA, IDEN |
| Remote Command: | <code>:DISPlay:VECTor:VIEW:PRESet SPECTrum STATistics</code> |
| Example: | <code>:DISP:VECT:VIEW:PRES SPEC</code> |
| Instrument S/W Revision: | Prior to A.02.00 |

Preset View: Spectrum/Time

This preset uses the Stack 2 layout style (see View/Display, Layout) with Spectrum in trace 1 and Main Time in trace 2

Key Path: **View/Display**
Mode: VSA, IDEN
Instrument S/W Revision: Prior to A.02.00



Vector Analysis Measurement View/Display

Preset View: Statistics

This preset uses the Stack 2 layout style (see View/Display, Layout) with the CCDF in trace 1 and Main Time in trace 2.

Key Path: **View/Display**
Mode: VSA, IDEN
Instrument S/W Revision: Prior to A.02.00



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 335](#).

This topic contains the following sections:

[“Measurement Commands for Monitor Spectrum” on page 293](#)

[“Remote Command Results for Monitor Spectrum Measurement” on page 293](#)

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” on page 569](#).

Remote Command Results for Monitor Spectrum Measurement

| Index 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

Prior to A.02.00

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 | Prior to A.02.00 |

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 |
| Instrument S/W Revision | Prior to A.02.00 |

Attenuation

Accesses a menu of functions that enable you to change the attenuation settings.

See AMPTD Y Scale, “[Attenuation](#)” on page 485 in the “Common Measurement Functions” section for more information.

| | |
|-------------------------|----------------------|
| Key Path | AMPTD Y Scale |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Instrument S/W Revision | Prior to A.02.00 |

Presel Center

See AMPTD Y Scale, “[Presel Center](#)” on page 497 in the “Common Measurement Functions” section for more information.

Presel Adjust

See AMPTD Y Scale, “[Preselector Adjust](#)” on page 498 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 500 in the “Common Measurement Functions” section for more information.

| | |
|-------------------------|----------------------|
| Key Path | AMPTD Y Scale |
| Instrument S/W Revision | Prior to A.02.00 |

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 | Prior to A.02.00 |

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 | Prior to A.02.00 |

Auto Couple

See “**AUTO COUPLE**” on page 483 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 | Prior to A.02.00 |

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 DVB-T/H: 3.9kHz DTMB: 3.9kHz |
| State Saved | Saved in instrument state. |
| Min | 1.0 Hz |
| Max | 8.0 MHz |
| Instrument S/W Revision | Prior to A.02.00 |

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 DVB-T/H: 39kHz DTMB: 39kHz |
| State Saved | Saved in instrument state. |
| Min | 1 Hz |
| Max | 50 MHz |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Instrument S/W Revision | Prior to A.02.00 |

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? |
| Preset | 106 ON |

Monitor Spectrum Measurement BW

| | |
|-------------------------|----------------------------|
| State Saved | Saved in instrument state. |
| Min | 2 |
| Max | 10000 |
| Instrument S/W Revision | Prior to A.02.00 |

Cont

See “[Cont \(Continuous Measurement/Sweep\)](#)” on page 503 in the section "Common Measurement Functions" for more information.

FREQ Channel

See “FREQ Channel” on page 759 for more information.

Input/Output

See “[Input/Output](#)” on page 507 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 | Prior to A.02.00 |

Select Marker

Displays 12 markers available for selection.

| | |
|-------------------------|------------------|
| Key Path | Marker |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Instrument S/W Revision | Prior to A.02.00 |

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**.

| | |
|-------------------------|--|
| Mode | All except SA and BASIC |
| 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? |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |

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 setting the value of the marker.

| | |
|-----------------------|--|
| Mode | All except SA and BASIC |
| 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? |

Monitor Spectrum Measurement Marker

| | |
|-------------------------|--|
| Example | CALC:MON:MARK:X:POS 0 CALC:MON:MARK:X:POS? |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |

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 | Prior to A.02.00 |

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 | Prior to A.02.00 |

Select Marker

Displays 12 markers available for selection.

| | |
|-------------------------|------------------|
| Key Path | Marker |
| Instrument S/W Revision | Prior to A.02.00 |

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:REFerence <integer> :CALCulate:MONitor:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:REFerence? |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |

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 |

Instrument S/W Revision Prior to A.02.00

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 |
| Instrument S/W Revision | Prior to A.02.00 |

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 | Prior to A.02.00 |

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 | Prior to A.02.00 |

Select Marker

Selects one of the 12 available markers.

| | |
|-------------------------|------------------------|
| Key Path | Marker Function |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Instrument S/W Revision | Prior to A.02.00 |

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 | Prior to A.02.00 |

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 |
| Instrument S/W Revision | Prior to A.02.00 |

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? |

| | |
|-------------------------|--|
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Instrument S/W Revision | Prior to A.02.00 |

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 | Prior to A.02.00 |

Meas

See “[Meas](#)” on page 569 in the section "Common 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 | Prior to A.02.00 |

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 | <pre>[:SENSE] :MONitor:AVERage:COUNT <integer> [:SENSe] :MONitor:AVERage:COUNT? [:SENSE] :MONitor:AVERage[:STATe] OFF ON 0 1 [:SENSe] :MONitor:AVERage[:STATe] ?</pre> |
| Example | <pre>MON:AVER:COUN 25 MON:AVER:COUN? MON:AVER ON MON:AVER?</pre> |
| Preset | 10 OFF |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 1000 |
| Instrument S/W Revision | Prior to A.02.00 |

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 | [:SENSe]:MONitor:AVERage:TCONtrol EXPonential REPeat [:SENSe]:MONitor:AVERage:TCONtrol? |
| Example | MON:AVER:TCON EXP MON:AVER:TCON? |
| Preset | EXPonential |
| State Saved | Saved in instrument state. |
| Range | ExpRepeat |
| Instrument S/W Revision | Prior to A.02.00 |

Meas Preset

Restores all the measurement parameters to their default values.

| Key Path | Meas Setup |
|-------------------------|-------------------------|
| Mode | All except SA and BASIC |
| Remote Command | :CONFigure:MONitor |
| Example | CONF:MON |
| Instrument S/W Revision | Prior to A.02.00 |

Mode

See “[Mode](#)” on page 587 in the section "Common Measurement Functions" for more information.

Mode Setup

See “Mode Setup” on page 601 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 | Prior to A.02.00 |

Recall

See “[Recall](#)” on page 611 in the section "Common Measurement Functions" for more information.

Restart

See “[Restart](#)” on page 633 in the section "Common Measurement Functions" for more information.

Save

See [“Save” on page 635](#) in the section "Common Measurement Functions" for more information.

Single

See “[Single \(Single Measurement/Sweep\)](#)” on page 661 in the section "Common Measurement Functions" for more information.

Source

See “[Source](#)” on page 663 in the section "Common 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 | Prior to A.02.00 |

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 DVB-T/H: 10.0MHz DTMB: 10.0MHz IDEN: See “Span Preset” on page 327 . |
| 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

Instrument S/W Revision Prior to A.02.00

Table 7-1 Span Preset

| iDEN Slot Format | WiDEN Slot Format 25kHz | WiDEN Slot Format 50kHz | WiDEN Slot Format 75kHz | WiDEN Slot Format 100kHz | WiDEN Slot Format 50kHz Out |
|------------------|-------------------------|-------------------------|-------------------------|--------------------------|-----------------------------|
| 60kHz | 60kHz | 85kHz | 110kHz | 135kHz | 135kHz |

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 Prior to A.02.00

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 Prior to A.02.00

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 | Prior to A.02.00 |

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 |
| Instrument S/W Revision | Prior to A.02.00 |

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 666 under Sweep/Control in the "Common Measurement Functions" section for more information.

| | |
|-------------------------|----------------------|
| Key Path | Sweep/Control |
| Instrument S/W Revision | Prior to A.02.00 |

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 666 in “common Measurement Functions” for more details.

| | |
|-------------------------|----------------------|
| Key Path | Sweep/Control |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Instrument S/W Revision | Prior to A.02.00 |

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 | Prior to A.02.00 |

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 | Prior to A.02.00 |

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 |

| | |
|-------------------------|--|
| Preset | WRITE |
| State Saved | Saved in instrument state. |
| Range | WRITE AVERage MAXHold MINHold for traces 1 through 3 |
| Instrument S/W Revision | Prior to A.02.00 |

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 | Prior to A.02.00 |

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 | Prior to A.02.00 |

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? |

| | |
|-------------------------|---|
| 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 | Prior to A.02.00 |

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 |

Monitor Spectrum Measurement Trace/Detector

| | |
|-------------------------|----------------------------|
| State Saved | Saved in instrument state. |
| Range | Auto Man |
| Instrument S/W Revision | Prior to A.02.00 |

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 | Prior to A.02.00 |
| 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 | Prior to A.02.00 |

Clear All Traces

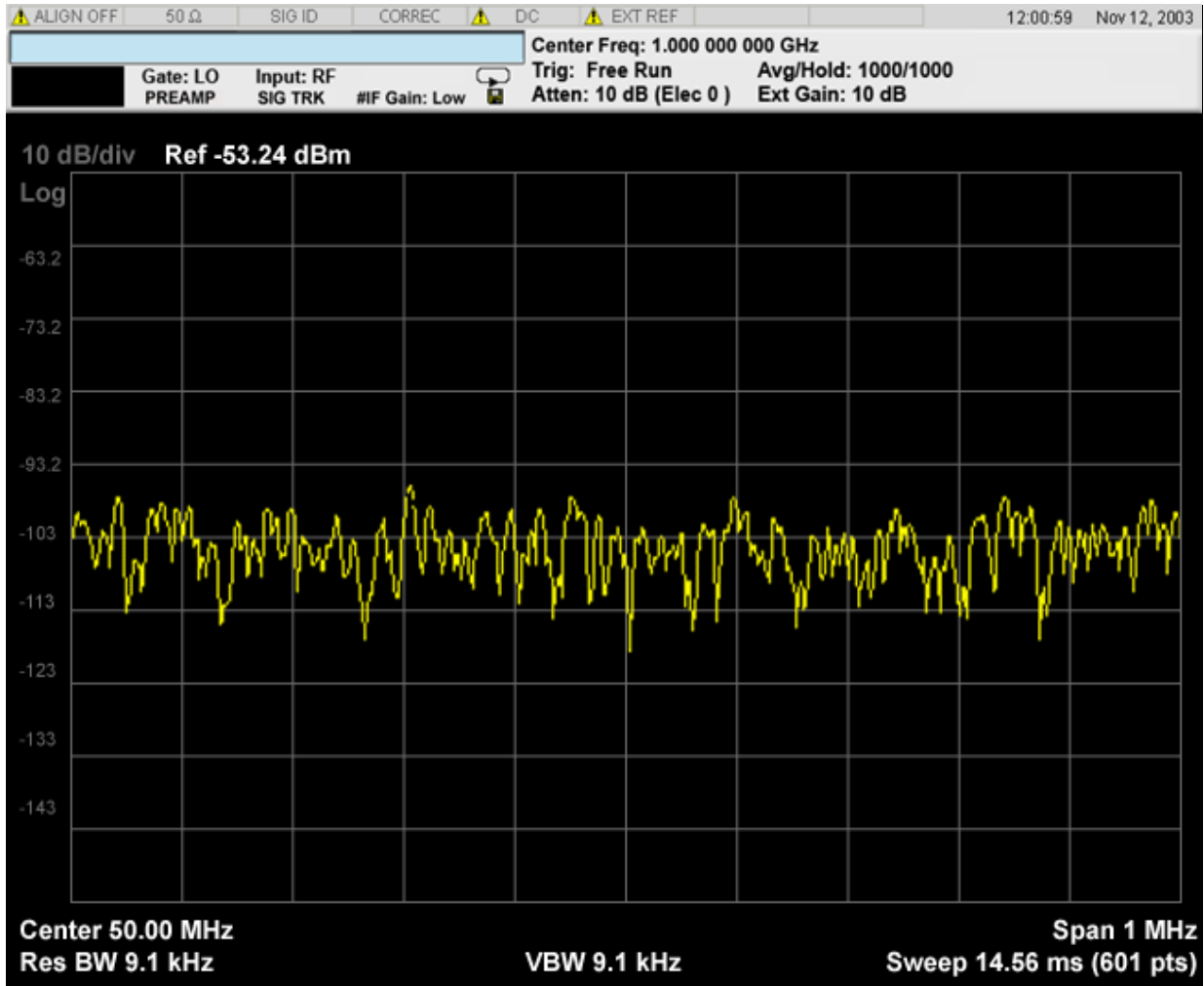
Clears all traces from the display.

| | |
|-------------------------|--------------------------|
| 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 | Prior to A.02.00 |

View/Display

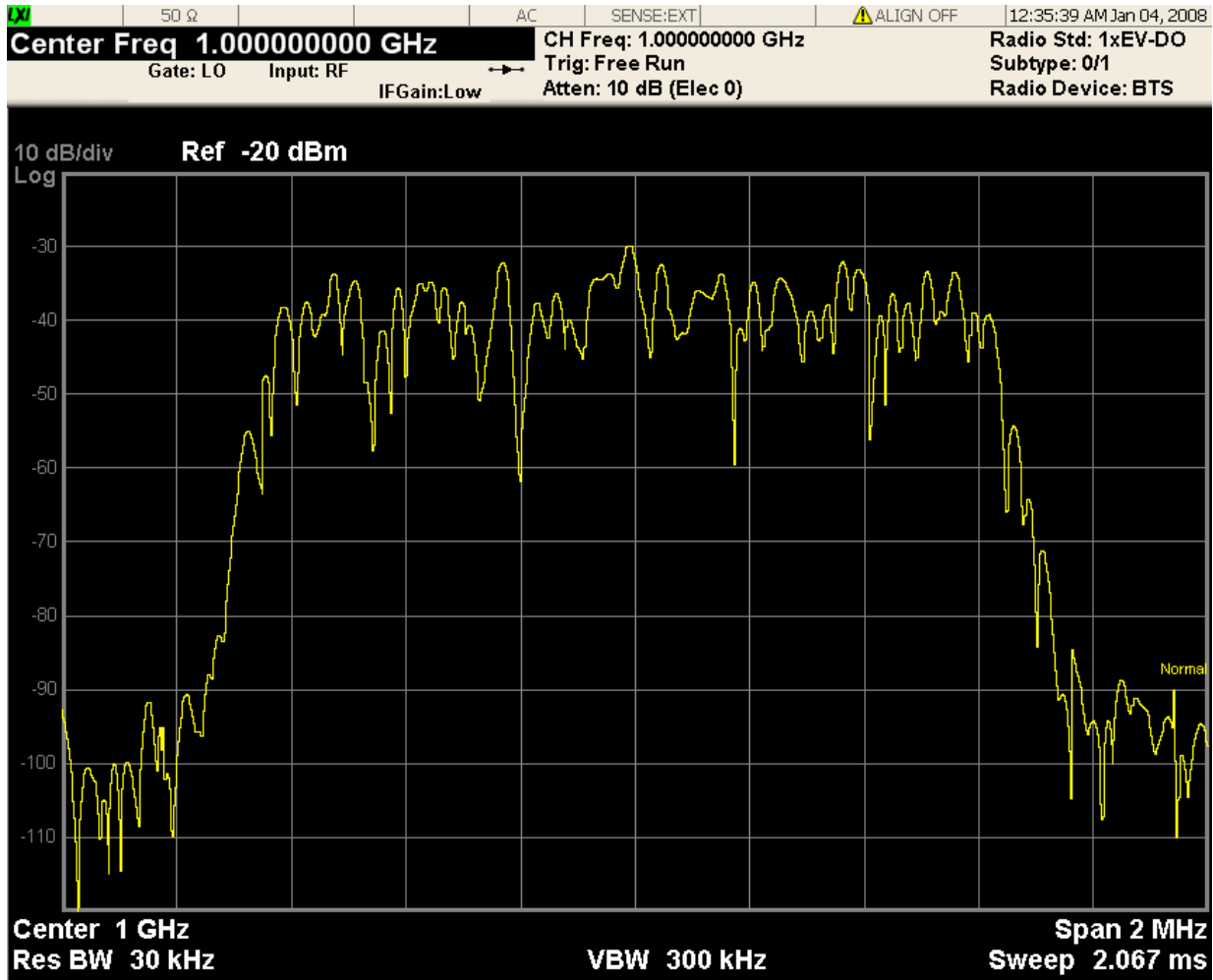
Accesses a menu of functions that enable you to control certain functions related to the display of the analyzer.

There is a single trace view for this measurement.



When the mode is CDMA1xEVDO, the view will be like

Monitor Spectrum Measurement View/Display



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 | Prior to A.02.00 |

Display

Accesses a menu of functions that enable you to set the display parameters.

See “[Display](#)” on page 735 in the "Common Measurement Functions" section for more information.

| | |
|-------------------------|------------------|
| Key Path | View/Display |
| Instrument S/W Revision | Prior to A.02.00 |

The iDEN Power measurement provides results for Occupied Bandwidth, and Adjacent Channel Power measurements for iDEN/WiDEN signals.

This topic contains the following sections:

[“Measurement Commands for iDEN Power Measurement” on page 337](#)

[“Remote Command Results for iDEN Power Measurement” on page 337](#)

Measurement Commands for iDEN Power Measurement

The particular tests enabled does not affect the order, or subopcode, of the remote results. Each available remote result, indexed by subopcode, has a corresponding summary trace. 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.

:CONF:IPOWER

:FETCh:IPOWER [n]?

:INITiate:IPOWER

:MEASure:IPOWER [n]?

:READ:IPOWER [n]?

For more measurement related commands, see the SENSE subsystem, and the section [“Remote Measurement Functions” on page 569](#).

Remote Command Results for iDEN Power Measurement

The following table denotes the returned results from the (FETCh|MEASure|READ):IPOWER commands, and their corresponding CALC:DATA queries, indexed by subopcode:

| Index n | Results Returned |
|-------------------------|---|
| Not specified or n=1 | <p>In order to read this result, trace 3 should display the "Spectrum" trace, and trace 4 should display the "Trc3 ACP Summary" trace. The power-on layout can satisfy this requirement. You can also press "Preset View:Test Standard" key at "View/Display" panel, or send SCPI ":DISPlay:IPOWER:VIEW:PRESet TSTD" to return to the power-on layout.</p> <p>Returns 29 comma-separated scalar results, corresponding exactly to the items in the ACP Summary trace:</p> <ol style="list-style-type: none"> 1. Unused, returns 0.0 2. TotalPwr (dBm)(Same value as RefPwr) 3. Unused, returns 0.0 4. Ref Pwr (dBm) 5. Lower Offset 1 Rel Power (dB) |

| Index n | Results Returned |
|-------------------------|---|
| Not specified or n=1 | <p>(Continued)</p> <ol style="list-style-type: none"> 6. Lower Offset 1 Abs Power (dBm) 7. Upper Offset 1 Rel Power (dB) 8. Upper Offset 1 Abs Power (dBm) 9. Lower Offset 2 Rel Power (dB) 10. Lower Offset 2 Abs Power (dBm) 11. Upper Offset 2 Rel Power (dB) 12. Upper Offset 2 Abs Power (dBm) 13. Lower Offset 3 Rel Power (dB) 14. Lower Offset 3 Abs Power (dBm) 15. Upper Offset 3 Rel Power (dB) 16. Upper Offset 3 Abs Power (dBm) 17. Lower Offset 4 Rel Power (dB) 18. Lower Offset 4 Abs Power (dBm) 19. Upper Offset 4 Rel Power (dB) 20. Upper Offset 4 Abs Power (dBm) 21. Lower Offset 5 Rel Power (dB) 22. Lower Offset 5 Abs Power (dBm) 23. Upper Offset 5 Rel Power (dB) 24. Upper Offset 5 Abs Power (dBm) 25. Unused, returns 0.0 26. Unused, returns 0.0 27. Unused, returns 0.0 28. Unused, returns 0.0 29. ACP Test Result (0 for fail, 1 for pass) <p>If the results are not available, NaN is returned. This includes the case of when the Adjacent Channel 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> |

| Index n | Results Returned |
|---------|--|
| n=2 | <p>In order to read this result, trace 1 should display the "Spectrum" trace, and trace 2 should display the "Trc1 ACP Summary" trace. The power-on layout can satisfy this requirement. You can also press "Preset View:Test Standard" key at "View/Display" panel, or send SCPI ":DISPlay:IPoWer:VIEW:PRESet TSTD" to return to the power-on layout.</p> <p>Returns 9 comma-separated scalar results, corresponding exactly to the items in the OBW Summary trace:</p> <ol style="list-style-type: none"> 1. OBW (Hz) 2. Pwr (dBm) 3. Total Pwr (dBm) 4. Pwr Ratio (no unit, for example 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) <p>If the results are not available, -NaN is returned.</p> |

In addition to these results, other results are defined in Common Functions, Data Queries, MEASure, READ, FETCH in [":CALCulate:DATA"](#) on page 872.

Key Path: **Meas**
Mode: IDEN
Instrument S/W Revision: A.02.00

AMPTD Y Scale

See “AMPTD Y Scale (Amplitude)” on page 746.

Auto Couple

See “**AUTO COUPLE**” on page 483 in the section "Common Measurement Functions" for more information.

BW

See “BW (Bandwidth)” on page 755.

Cont

See “[Cont \(Continuous Measurement/Sweep\)](#)” on page 503 in the section "Common Measurement Functions" for more information.

Frequency Channel

See “FREQ Channel” on page 759.

Input/Output

See “[Input/Output](#)” on page 507 in the section "Common Measurement Functions" for more information.

Marker

See “Marker” on page 763.

Marker Function

See “Marker Function” on page 782.

Marker To

See “Marker -> (Marker To)” on page 779.

Meas

See “[Meas](#)” on page 569 in the section "Common Measurement Functions" for more information.

Meas Setup

Changing any of the parameters under the Radio menu, or changing the test enabled in the Test Selection menu, or pressing Test Preset will change measurement setup parameters as noted in the Coupling sections of the individual parameters.

See “[More Information about Meas Setup:](#)” on page 350.

| | |
|--------------------------|------------------------|
| Key Path: | Front-panel key |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

More Information about Meas Setup:

The first three menu softkeys are intended to be set and used in the order they appear in this menu, top to bottom: They are outlined in the following sections:

1. Set up the Radio parameters,
2. Make the Test Selection (“[Test Selection](#)” on page 350) or select the Tests that you want to run,
3. Perform a Test Preset, which uses what you have just selected to preset the remaining measurement parameters to a known state which should be a good starting point for your test(s).

After performing these three steps, you may want to fine-tune the remaining parameters to optimize the measurement for your application.

Test Selection

The Test Selection parameters control which measurement calculations are enabled, with accompanying test comparisons, A change in Test Selection changes some measurement setup parameters, as noted in their Coupling descriptions.

| | |
|--------------------------|-------------------|
| Key Path: | Meas Setup |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

OBW

This enables Occupied Bandwidth testing. The bandwidth of the signal is measured and compared to the OBW Test Limit.

| | |
|-----------|-----------------------------------|
| Key Path: | Meas Setup, Test Selection |
| Mode: | IDEN |

| | |
|--------------------------|--|
| Remote Command: | [:SENSE] : IPOWER : TSEL : OBWidth OFF ON 0 1 [:SENSE] : IPOWER : TSEL : OBWidth ? |
| Example: | :IPOWER:TSEL:OBW ON |
| Dependencies/Couplings: | Changes in this parameter may have an immediate effect on other parameters, as well as affecting parameter values set by Test Preset (“ Test Preset ” on page 351), noted in the coupling row table entries for the affected parameters. |
| Preset: | ON |
| State Saved: | Saved in instrument state. |
| Range: | ON OFF |
| Instrument S/W Revision: | A.02.00 |

ACP

This enables Adjacent Channel Power testing. The ACP test measures and reports power in the reference band, and compares that to the power in up to five adjacent channel bands.

| | |
|--------------------------|--|
| Key Path: | Meas Setup, Test Selection |
| Mode: | IDEN |
| Remote Command: | [:SENSE] : IPOWER : TSEL : ACPower OFF ON 0 1 [:SENSE] : IPOWER : TSEL : ACPower ? |
| Example: | :IPOWER:TSEL:ACP ON |
| Dependencies/Couplings: | Changes in this parameter may have an immediate effect on other parameters, as well as affecting parameter values set by Test Preset, both as noted in the coupling row table entries for the affected parameters. |
| Preset: | ON |
| State Saved: | Saved in instrument state. |
| Range: | ON OFF |
| Instrument S/W Revision: | A.02.00 |

Test Preset

Test Preset key initializes the setup to make the tests selected, based on the radio setup specified. Test Preset initializes all the coupled parameters for the selected tests. This key color is green, indicating its as a preset key.

| | |
|------------------------|-------------------|
| Key Path: | Meas Setup |
| Mode: | IDEN |
| Remote Command: | CONF : IPOWER |

iDEN Power Measurement Meas Setup

| | |
|--------------------------|--|
| Example: | CONF:IPOW |
| Dependencies/Couplings: | This affects parameter values as detailed below. It also performs a Preset View:Test Standard. |
| Instrument S/W Revision: | A.02.00 |

NOTE Test Preset does not change the Test selection (OBW Test and/or ACP Test).
Parameters affected by Test Preset are noted in the Coupling line of the parameter tables for each affected parameter.

Power Calc Uses

The Power Calc Uses parameter sets whether OBW and ACP measure over the whole burst, or measure over the MQAM modulation part of the burst. This distinction is made by enabling or disabling time gating. Since only Full Signal is valid when an Outbound Slot Format is active, this key is grayed out when Outbound Slot Format is active.

| | |
|--------------------------|--|
| Key Path: | Meas Setup |
| Mode: | IDEN |
| Remote Command: | CALCulate:IPower:PCALculation MOD FULL CALCulate:IPower:PCALculation? |
| Example: | CALC:IPOW:PCAL MOD |
| Dependencies/Couplings: | This parameter affects FFT Window, Gate parameters. In particular, Gate (On/Off) (is controlled directly by this parameter and visa versa. It is set to Full Signal when an Outbound Slot Format is selected. It is set to Modulation by Test Preset if the Slot Format is an Inbound type and to Full Signal when Slot Format is an Outbound type. |
| Preset: | MOD |
| State Saved: | Saved in instrument state. |
| Range: | MOD FULL |
| Readback Text: | MOD FULL |
| Instrument S/W Revision: | A.02.00 |

Modulation

This key selects Power Calc Uses Modulation. Only the modulated portion of the burst will be analyzed.

| | |
|--------------------------|------------------------------------|
| Key Path: | Meas setup, Power Calc Uses |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

Full Signal

This key selects Power Calc Uses Full Signal. The entire slot will be analyzed, which includes time that the burst is off.

| | |
|--------------------------|------------------------------------|
| Key Path: | Meas setup, Power Calc Uses |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

ACP Setup

ACP in the iDEN Power measurement is set up as in other VXA Measurements, with the following exceptions:

The ACP Setup softkey menu that appears under the Meas Setup key is for setting the standard ACP test parameters. These will appear on trace 3 when using the Test Standard Preset view. ACP Setup softkeys for this and all other traces are found under the Trace/Detector key. Corresponding keys under both menus perform the same setup functions.

See [“More Information about ACP Setup” on page 353](#).

| | |
|--------------------------|-------------------|
| Key Path: | Meas Setup |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

More Information about ACP Setup

SCPI access to ACP features under the Meas Setup key is the same as for the general case (refer to trace 3) and is documented in the Trace/Detector, ACP sections, [“ACP Setup” on page 834](#).

Other keys and SCPI in this menu follow VXA standard conventions for ACP setup.

Five sets of adjacent channel offsets and bandwidths are available, the default state is with one set enabled, and the other four sets configured. An exception to this is when the Outer 50 kHz Carrier Config is selected, the first two offsets are enabled and the other 3 configured.

Test Preset or changes to Carrier Config sets the ACP parameters as follows. Changing between iDEN

**iDEN Power Measurement
Meas Setup**

and WiDEN Slot Format may also result in other couplings or changes.

| ACP Enabled | iDEN formats | iDEN formats, WiDEN 25 kHz | WiDEN 50 kHz | WiDEN 75 kHz | WiDEN 100 kHz | Outer 50 kHz |
|----------------------|---------------------|-----------------------------------|---------------------|---------------------|----------------------|---------------------|
| Reference BW | 18 kHz | 18 kHz | 43 kHz | 68 kHz | 93 kHz | 93 kHz |
| Channel A | Enable | Enable | Enable | Enable | Enable | Enable |
| Channel A offset | +/- 25 kHz | +/- 25 kHz | +/- 37.5 kHz | +/- 50 kHz | +/- 62.5 kHz | +/- 62.5 kHz |
| Channel A BW | 10 kHz | 18 kHz | 18 kHz | 18 kHz | 18 kHz | 18 kHz |
| Channel A Test Limit | -50 dBc, On | -50 dBc, On | -50 dBc, On | -50 dBc, On | -50 dBc, On | -50 dBc, On |
| Channel B | Disable | Disable | Disable | Disable | Disable | Enable |
| Channel B offset | +/- 50 kHz | +/- 50 kHz | +/- 62.5 kHz | +/- 75 kHz | +/- 87.5 kHz | +/- 87.5 kHz |
| Channel B BW | 10 kHz | 18 kHz | 18 kHz | 18 kHz | 18 kHz | 18 kHz |
| Channel B Test Limit | Off | Off | Off | Off | Off | -50 dBc, On |
| Channel C | Disable | Disable | Disable | Disable | Disable | Disable |
| Channel C offset | +/- 75 kHz | +/- 75 kHz | +/- 87.5 kHz | +/- 100 kHz | +/- 112.5 kHz | +/- 112.5 kHz |
| Channel C BW | 10 kHz | 18 kHz | 18 kHz | 18 kHz | 18 kHz | 18 kHz |
| Channel C Test Limit | Off | Off | Off | Off | Off | Off |
| Channel D | Disable | Disable | Disable | Disable | Disable | Disable |
| Channel D offset | +/- 100 kHz | +/- 100 kHz | +/- 112.5 kHz | +/- 125 kHz | +/- 137.5 kHz | +/- 137.5 kHz |
| Channel D BW | 10 kHz | 18 kHz | 18 kHz | 18 kHz | 18 kHz | 18 kHz |
| Channel D Test Limit | Off | Off | Off | Off | Off | Off |
| Channel E | Disable | Disable | Disable | Disable | Disable | Disable |
| Channel E offset | +/- 125 kHz | +/- 125 kHz | +/- 137.5 kHz | +/- 150 kHz | +/- 162.5 kHz | +/- 162.5 kHz |
| Channel E BW | 10 kHz | 18 kHz | 18 kHz | 18 kHz | 18 kHz | 18 kHz |
| Channel E Test Limit | Off | Off | Off | Off | Off | Off |

Carrier Meas Noise BW

This softkey allows you to define the measurement noise bandwidth of the reference channel. For more information, see [“Carrier Meas Noise BW” on page 838](#) for Trace 3.

| | |
|--------------------------|---|
| Key Path: | Meas Setup, ACP Setup |
| Mode: | IDEN |
| Dependencies/Couplings: | Test Preset), Carrier Config, and Slot Format set this as defined in the table under ACP Setup. |
| Instrument S/W Revision: | A.02.00 |

Offsets

The ACP measurement compares power in frequency bands that are 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 and bandwidth. Each offset defines two bands or sidebands, one above the reference frequency and one below. Each band is used individually in the ACP calculation.

The Offsets branch key accesses a menu that has a branch key for each offset. Each offset branch key shows a summary of its current parameters. Pressing any of the Offset A|B|C|D|E softkeys will access a menu for adjusting that offsets parameters.

| | |
|--------------------------|-------------------------------------|
| Key Path: | Trace/Detector, ACP, Offsets |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

Offset Freq This softkey toggles the ACP analysis on or off for a selected offset, and will also set the offset frequency (which is relative to the center frequency). For more information, see [“Offset Freq” on page 840](#).

| | |
|--------------------------|--|
| Key Path: | Meas Setup, ACP Setup, Offset A B C D E |
| Mode: | IDEN |
| Dependencies/Couplings: | Test Preset, Carrier Config, and Slot Format set this as defined in the table under ACP Setup. |
| Instrument S/W Revision: | A.02.00 |

Offset Meas Noise BW This softkey allows you to set the measurement noise bandwidth for the power measurement of a selected offset band. For more information, see [“Carrier Meas Noise BW” on page 838](#).

| | |
|-----------|--|
| Key Path: | Meas Setup, ACP Setup, Offset A B C D E |
| Mode: | IDEN |

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Dependencies/Couplings: Test Preset, Carrier Config, and Slot Format set this as detailed in the table under ACP Setup.

Instrument S/W Revision: A.02.00

Offset Relative Limit This softkey allows you to set the ACP test limit for the power measurement of a selected offset band. For more information, see [“Offset Relative Limit” on page 842](#).

Key Path: **Meas Setup, ACP Setup, Offset A|B|C|D|E**

Mode: IDEN

Dependencies/Couplings: Test Preset, Carrier Config, and Slot Format set this as detailed in the table under ACP Setup.

Instrument S/W Revision: A.02.00

OBW Centroid -> CF

The Centroid -> CF softkey copies the current measured Centroid frequency to the Center Frequency. For more information, see [“OBW Setup \(Occupied Bandwidth\)” on page 843](#).

Key Path: **Meas Setup**

Mode: IDEN

Instrument S/W Revision: A.02.00

Avg Number

This softkey sets the number of time records whose measurement results will be averaged. For more information, see [“Avg Number” on page 790](#).

Key Path: **Meas Setup, More**

Mode: IDEN

Dependencies/Couplings: Test Preset sets to 20

Preset: On, 20

Instrument S/W Revision: A.02.00

Average Mode

Average Mode controls the averaging method when 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, Average Mode has no effect. For more information, see [“Average Mode” on page 791](#).

| | |
|--------------------------|---------------------------------|
| Key Path: | Meas Setup, More |
| Mode: | IDEN |
| Dependencies/Couplings: | Test Preset sets to EXPonential |
| Preset: | EXPonential |
| Instrument S/W Revision: | A.02.00 |

Average Setup

Access a menu allowing you to set Averaging parameters for all VSA based measurements. There are no SCPI/features unique to this measurement. For more information, see [“Average Setup” on page 792](#).

| | |
|--------------------------|-------------------------|
| Key Path: | Meas Setup, More |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

Average Type

The Average Type softkey allows you to select the type of averaging. For more information, see [“Average Type” on page 792](#).

| | |
|--------------------------|--|
| Key Path: | Meas Setup, More, Average Setup |
| Mode: | IDEN |
| Dependencies/Couplings: | Test Preset sets to RMS |
| Preset: | RMS |
| Instrument S/W Revision: | A.02.00 |

RMS This softkey selects the RMS Average Type.

| | |
|--------------------------|--|
| Key Path: | Meas Setup, More, Average Setup |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

iDEN Power Measurement Meas Setup

Time This softkey selects the Time Average Type.

Key Path: **Meas Setup, More, Average Setup**
Mode: IDEN
Instrument S/W Revision: A.02.00

Max This softkey selects the Max Average Type.

Key Path: **Meas Setup, More, Average Setup**
Mode: IDEN
Instrument S/W Revision: A.02.00

Fast Average

Fast average controls the display updates of average data. For more information, see [“Fast Average” on page 793](#).

Key Path: **Meas Setup, More, Average Setup**
Mode: IDEN
Dependencies/Couplings: Test Preset sets to OFF
Preset: OFF
Instrument S/W Revision: A.02.00

Update Rate

The Update Rate controls how often the display updates when fast averaging is turned on. For more information, see [“Update Rate” on page 793](#).

Key Path: **Meas Setup, More, Average Setup**
Mode: IDEN
Dependencies/Couplings: Test Preset sets to Manual, 20
Preset: Auto, 20
Instrument S/W Revision: A.02.00

OBW % Power

This softkey is used to specify the percentage of power used to determine the occupied BW, and to turn the OBW function on or off. For more information, see [“OBW Power” on page 845](#).

| | |
|--------------------------|---------------------------|
| Key Path: | Meas Setup, More |
| Mode: | IDEN |
| Dependencies/Couplings: | Test Preset sets to 99.0% |
| Preset: | 99.0 % |
| Instrument S/W Revision: | A.02.00 |

OBW Limit

This softkey sets the OBW Limit, as well as turns it off or on. For more information, see [“BW Limit” on page 847](#).

| | |
|--------------------------|-----------------------------|
| Key Path: | Meas Setup, More |
| Mode: | IDEN |
| Dependencies/Couplings: | Test Preset sets as follows |
| Preset: | 20 kHz (On) |
| Instrument S/W Revision: | A.02.00 |

OBW Test Preset turns this On and sets these values:

| | iDEN formats, WiDEN 25 kHz | WiDEN 50 kHz | WiDEN 75 kHz | WiDEN 100 kHz | WiDEN Outer 50 kHz |
|----------------|-------------------------------|-----------------|-----------------|------------------|-----------------------|
| OBW Test Limit | 20 kHz | 45 kHz | 70 kHz | 95 kHz | 95 kHz |

Mode

See “Mode” on page 587.

Mode Setup

See “Mode Setup” on page 601.

Peak Search

See “Peak Search” on page 795.

Recall

See “[Recall](#)” on page 611 in the section "Common Measurement Functions" for more information.

Restart

See “[Restart](#)” on page 633 in the section "Common Measurement Functions" for more information.

Save

See [“Save” on page 635](#) in the section "Common Measurement Functions" for more information.

Single

See “[Single \(Single Measurement/Sweep\)](#)” on page 661 in the section "Common Measurement Functions" for more information.

Source

See “[Source](#)” on page 663 in the section "Common Measurement Functions" for more information.

SPAN X Scale

See “SPAN X Scale” on page 800 for more information.

Span

This softkey sets the frequency Span of the measurement. For more information, see “More Information about Span” on page 368 and “Span” on page 800.

| | |
|--------------------------|---|
| Key Path: | SPAN X Scale |
| Mode: | IDEN |
| Dependencies/Couplings: | When an individual Test is enabled or disabled (“Test Selection” on page 350), this parameter is set as detailed below. This parameter may be changed when Carrier Config and Slot Format are changed as well as when ACP Setup (“ACP Setup” on page 353) parameters are changed which affect the span needed to include the carrier and all enabled offsets, as detailed below. |
| Instrument S/W Revision: | A.02.00 |

More Information about Span

The measurements in IDEN have different span settings. However the Span parameter is shared between measurements. To prevent the change of Span parameter in each measurement from affecting other measurements, when switching into one measurement, the Span parameter will be changed according to its default value. The default value might be different per iDEN slot format and WiDEN Carrier configuration.

For iDEN Power measurement, the default value is calculated according to slot format, carrier configuration and test settings. If the current span value is less than the default value, the span will be changed to the default value. Otherwise, the span is not changed.

When ACP test is on, the span value default will be as displayed in the table below:

| iDEN Slot Format | WiDEN Slot Format 25kHz | WiDEN Slot Format 50kHz | WiDEN Slot Format 75kHz | WiDEN Slot Format 100kHz | WiDEN Slot Format 50kHz Out |
|------------------|-------------------------|-------------------------|-------------------------|--------------------------|-----------------------------|
| 60kHz | 68kHz | 93kHz | 118kHz | 143kHz | 143kHz |

When ACP test is off, the default span value is displayed in below table:

| iDEN Slot Format | WiDEN Slot Format 25kHz | WiDEN Slot Format 50kHz | WiDEN Slot Format 75kHz | WiDEN Slot Format 100kHz | WiDEN Slot Format 50kHz Out |
|------------------|-------------------------|-------------------------|-------------------------|--------------------------|-----------------------------|
| 35kHz | 35kHz | 60kHz | 85kHz | 110kHz | 110kHz |

For MotoTalk measurements, the span default value is not affected by iDEN settings. It will have a fixed default value of 60kHz.

For Vector Analysis measurement, Monitor Spectrum measurement and iDEN Demod measurement, when switching into the measurement, the span value is changed to the default value, which is displayed in table below.

| iDEN Slot Format | WiDEN Slot Format 25kHz | WiDEN Slot Format 50kHz | WiDEN Slot Format 75kHz | WiDEN Slot Format 100kHz | WiDEN Slot Format 50kHz Out |
|------------------|-------------------------|-------------------------|-------------------------|--------------------------|-----------------------------|
| 60kHz | 60kHz | 85kHz | 110kHz | 135kHz | 135kHz |

Sweep/Control

See “Sweep / Control” on page 665.

Trace/Detector

See “Trace/Detector” on page 809.

Trigger

See “Trigger” on page 850.

Hardware Trigger

The default value is "Video" for this measurement.

| | |
|--------------------------|--|
| Key Path: | Trigger |
| Dependencies/Couplings: | When slot type is inbound, trigger source will be set to VIDEo; When slot type is outbound, trigger source will be set to IMMEDIATE. |
| Preset: | VIDEo |
| Instrument S/W Revision: | A.02.00 |

Video (IF Envelope)

Trigger Level The default value is 31.6mV.

| | |
|--------------------------|----------------------|
| Key Path: | Trigger,Video |
| Preset: | 31.6mV |
| Instrument S/W Revision: | A.02.00 |

Trig Delay The default value is –500 us.

| | |
|--------------------------|-----------------------|
| Key Path: | Trigger, Video |
| Preset: | 0 ON |
| Instrument S/W Revision: | A.02.00 |

Trig Holdoff The default value is 10 ms.

| | |
|--------------------------|-----------------------|
| Key Path: | Trigger, Video |
| Preset: | 10 ms ON |
| Instrument S/W Revision: | A.02.00 |

View/Display

You may change the traces configured for any window at any time using the standard UI.

The **Test Preset** key and the **Preset View: Test Standard** key configure a default window layout and trace setup for the selected tests.

The default layout includes two windows for each test enabled, for example, either 2 or 4 windows.

When the OBW test is enabled, the default layout has the Spectrum trace with the occupied bandwidth highlight displayed in trace 1, and the OBW Summary trace in trace 2.

When the ACP test is enabled, the default layout has the Spectrum trace with ACP color bars displayed in trace 3, and the ACP Summary trace in trace 4.

If a no test state is enabled (generally a transitory event), the two traces from the last test enabled will continue to be displayed.

The view setup can be changed by selections from the View/Display menu, or by pressing **Test Preset** after enabling the desired tests, or by individually selecting traces and layout. You may change the number of windows in the layout, or the contents of those windows at will.

NOTE The Preset View softkeys do an immediate action of changing the layout and view for various Preset Views unique to this measurement. These Preset Views are actions, not states.

| | |
|--------------------------|------------------------|
| Key Path: | Front-panel key |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

Display

See [“Display” on page 735](#) in the "Common Measurement Functions" section for more information.

Layout

See [“Layout” on page 865](#).

Preset View: Test Standard

Preset the layout to pre-defined patterns.

| | |
|--------------------------|---|
| Key Path: | View/Display |
| Remote Command: | :DISPlay:IPower:VIEW:PRESet TSTD ACP ACPOBW ACPBURST |
| Example: | :DISP:IPOW:VIEW:PRES TSTD |
| Notes: | TSTD: Test Standard ACP: ACP ACPOBW: ACP & OBW ACPBURST: ACP Burst |
| Dependencies/Couplings: | Action dependent on the state of the test selections |
| Instrument S/W Revision: | A.02.00 |

Preset View: ACP

Preset the layout to pre-defined patterns.

| | |
|--------------------------|---|
| Key Path: | View/Display |
| Example: | :DISP:IPOW:VIEW:PRES ACP |
| Notes: | TSTD: Test Standard ACP: ACP ACPOBW: ACP & OBW ACPBURST: ACP Burst |
| Instrument S/W Revision: | A.02.00 |

Preset View: ACP & OBW

Preset the layout to pre-defined patterns.

| | |
|--------------------------|---|
| Key Path: | View/Display |
| Example: | :DISP:IPOW:VIEW:PRES ACPOBW |
| Notes: | TSTD: Test Standard ACP: ACP ACPOBW: ACP & OBW ACPBURST: ACP Burst |
| Instrument S/W Revision: | A.02.00 |

Preset View: OBW & Burst

Preset the layout to pre-defined patterns.

| | |
|--------------------------|---|
| Key Path: | View/Display |
| Example: | :DISP:IPOW:VIEW:PRES ACPBURST |
| Notes: | TSTD: Test Standard ACP: ACP ACPOBW: ACP & OBW ACPBURST: ACP Burst |
| Instrument S/W Revision: | A.02.00 |

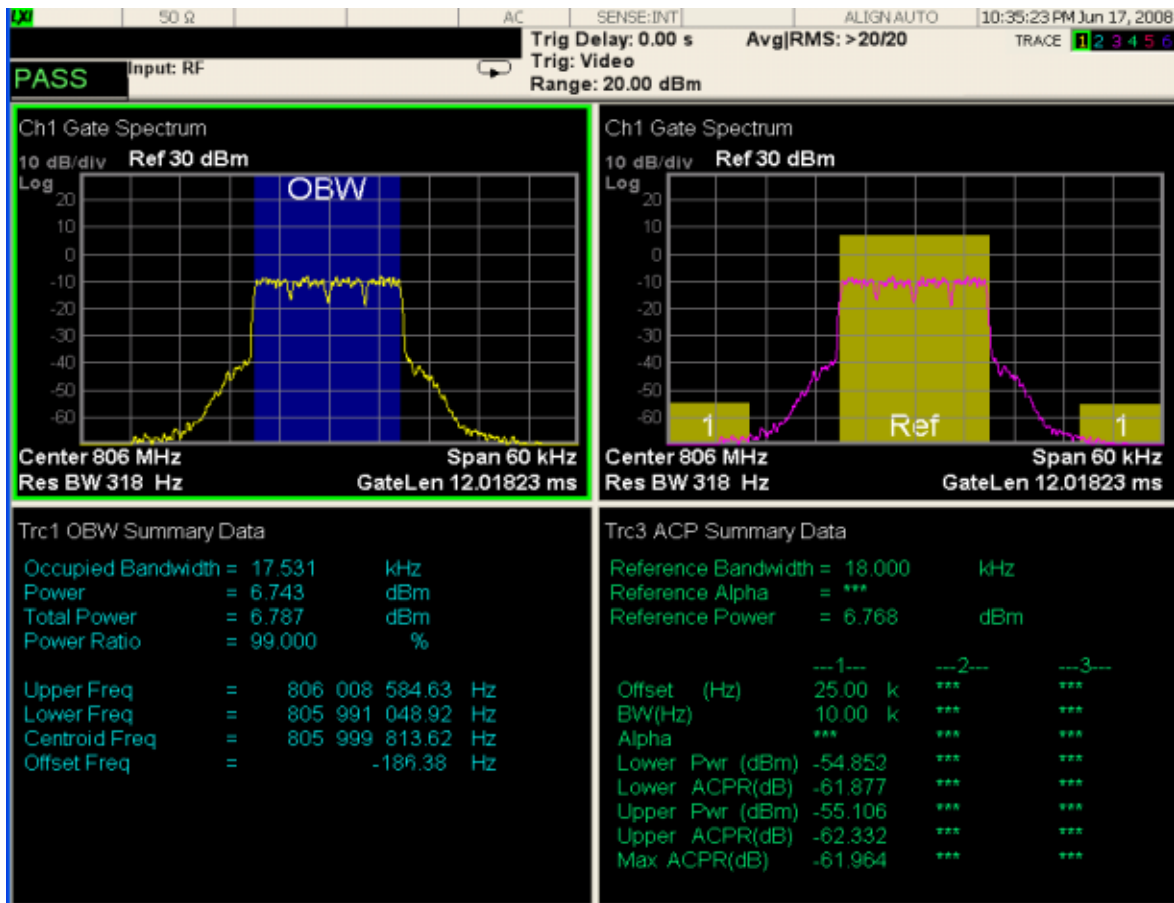
Measurement Views

This measurement has four views as follows.

Preset View: Test Standard

The Test Standard view provides the preset view for the set of selected tests. The exact action is dependent on the test selections.

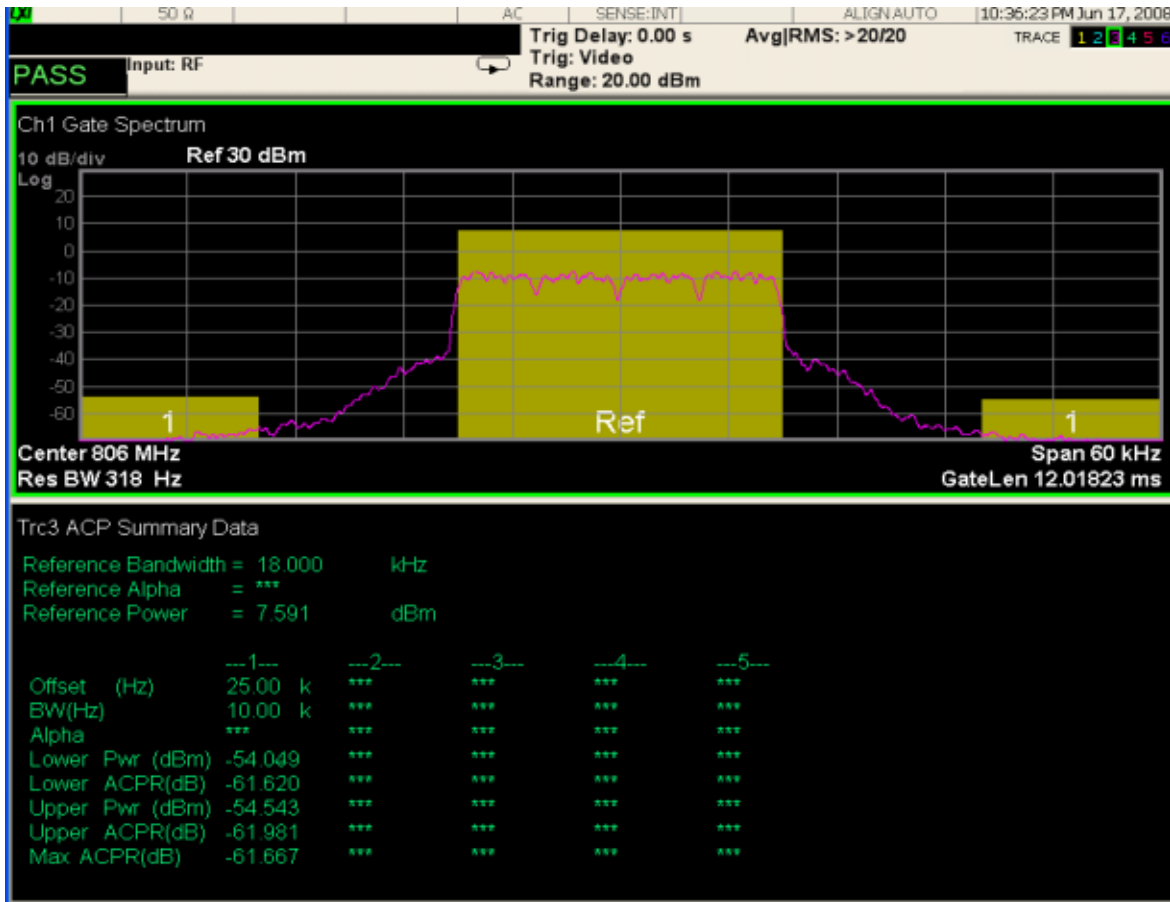
The following illustration is the display after pressing **Preset View:Test Standard**.



Preset View: ACP

The ACP view is a 2 window display, with the Spectrum and the ACP color bars in trace 3, and the ACP Summary in trace 4. This is the default view when only the ACP test is enabled. If the ACP Test is not enabled (“ACP” on page 351), these traces will still be shown but the ACP Summary trace will contain no data.

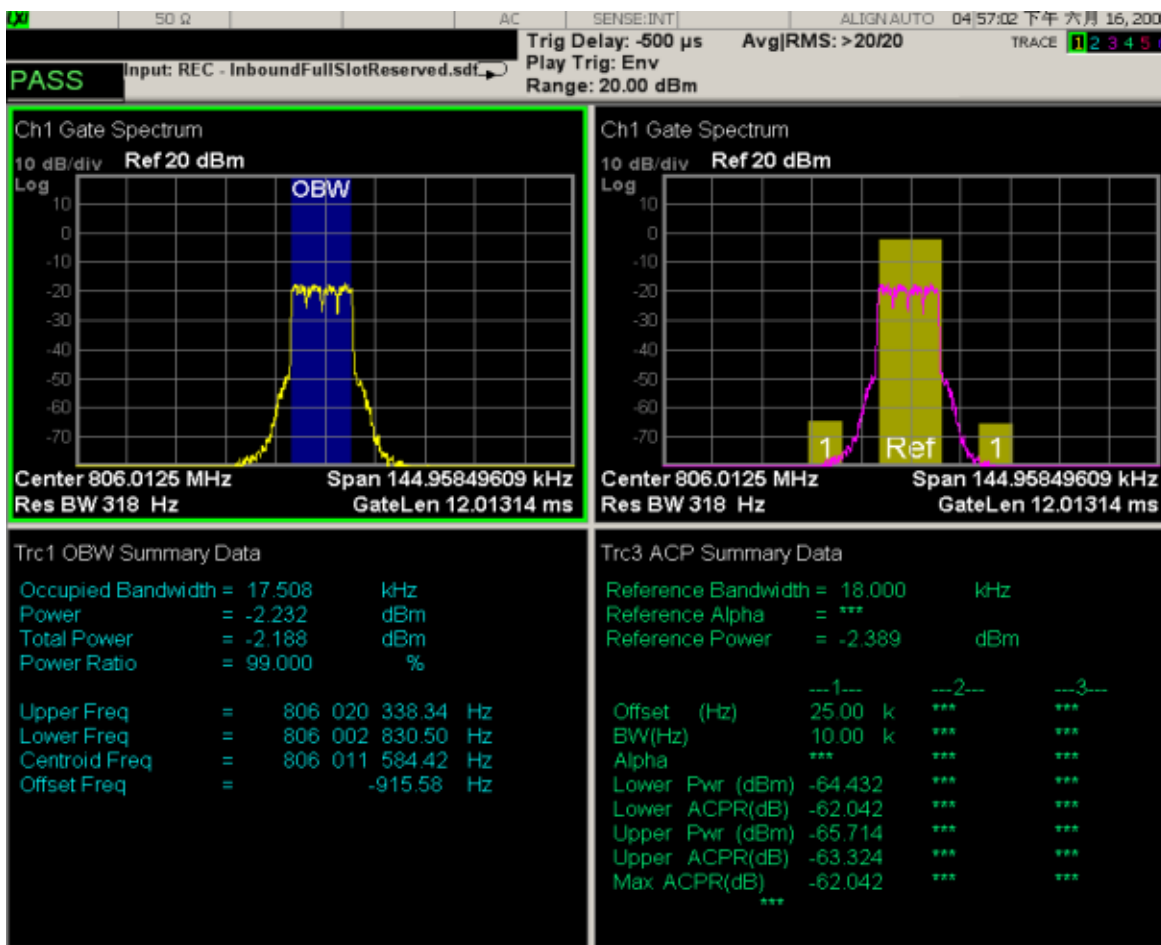
Below is the display after pressing this key.



Preset View: OBW & ACP

The OBW & ACP view is a 4 window layout. Trace 1 displays the Spectrum with OBW measurement, and trace 2 displays the OBW Summary. Trace 3 displays the Spectrum with ACP measurement, and trace 4 displays the ACP Summary. This is the default view when OBW and ACP tests are enabled. If the OBW Test is not enabled (“OBW” on page 350), these traces will still be shown but the OBW Summary trace will contain no data and the ACP measurement will not be visible on the Spectrum. If the ACP Test is not enabled (“ACP” on page 351), these traces will still be shown but the ACP Summary trace will contain no data and the ACP measurement will not be visible on the Spectrum.

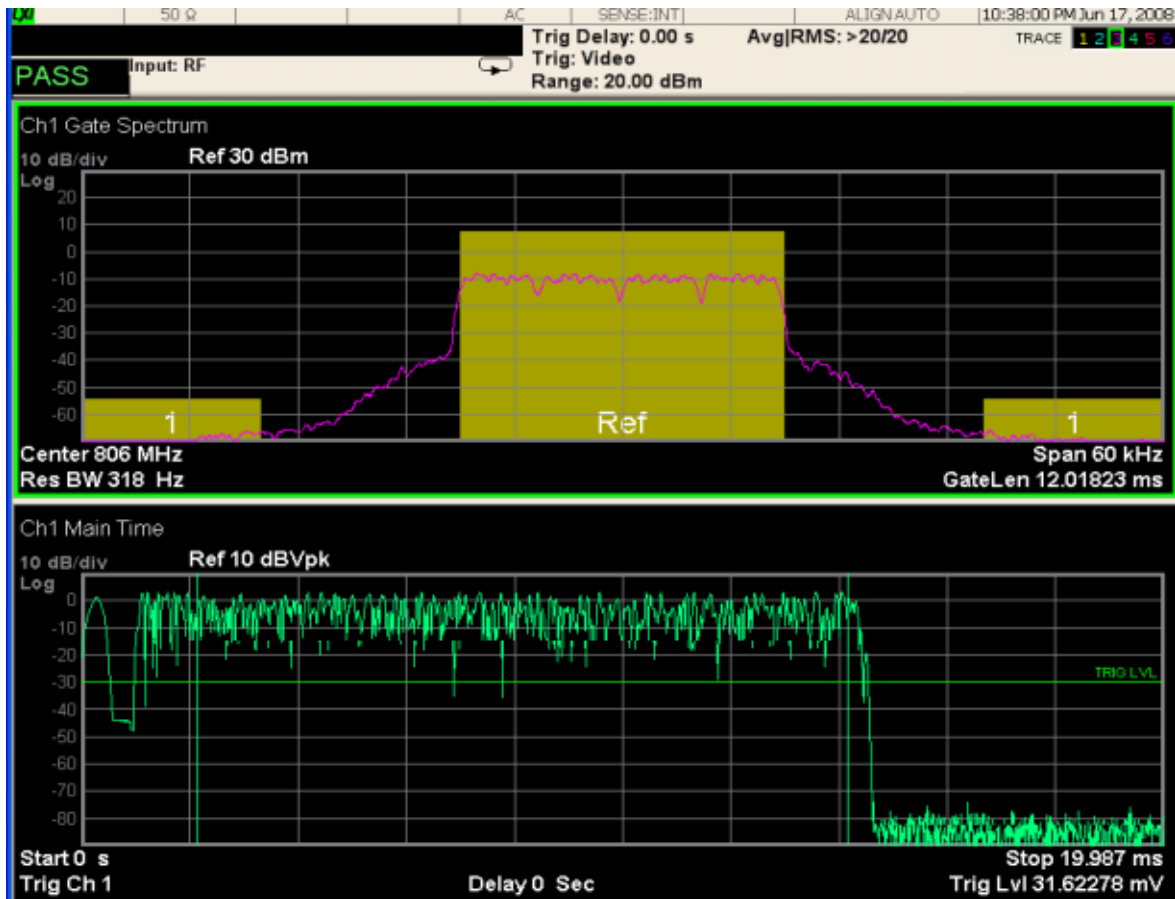
Below is the display after pressing this key.



Preset View: ACP & Burst

The ACP & Burst view is a 2 window layout. Trace 5 displays the Spectrum with ACP measurement, and trace 6 displays Main Time. If the ACP Test is not enabled (“ACP” on page 351), the ACP measurement will not be visible on the Spectrum trace.

Below is the display after pressing this key.



Front Panel Results

There are two sets of test results combined into this measurement.

- Occupied Bandwidth Results

OBW results are available, including a color bar highlighting the occupied bandwidth, and an OBW summary trace.

- Adjacent Channel Power Results

ACP results are available, including color bars on a spectrum trace highlighting the reference channel and the adjacent channels, and an overall ACP summary.

This measurement consists of Test setups for modulation quality (EVM), power vs. time (PvT) and bit error rate (BER). There are three sets of demodulation-based test results combined into this measurement. Each set of results has limit testing to provide a Pass or Fail indication. Additional results can be obtained for each Test.

This topic contains the following sections:

[“Measurement Commands for iDEN Demod Measurement ” on page 381](#)

[“Remote Command Results for iDEN Demod Measurement” on page 381](#)

Measurement Commands for iDEN Demod Measurement

The set of tests enabled do not affect the order, or subopcode, of the remote results. Each available remote result, indexed by subopcode, has a corresponding summary trace. 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.

:CONF:IDEMod

:FETCh:IDEMod [n]?

:INITiate:IDEMod

:MEASure:IDEMod [n]?

:READ:IDEMod [n]

For more measurement related commands, see the SENSE subsystem, and the section [“Remote Measurement Functions” on page 569](#).

Remote Command Results for iDEN Demod Measurement

The following table denotes the returned results from the (FETCh|MEASure|READ):IDEMod commands, indexed by subopcode:

| Index n | Results Returned |
|--------------------------|---|
| Not specified, or n=1 | Returns 23 comma-separated scalar results, corresponding exactly to the items returned in the MQAM Summary trace: <ol style="list-style-type: none"> 1. Total BER (ratio) 2. Peak BER (ratio) 3. Slot location with peak BER, counting from 0 4. Residual BER (ratio) 5. Bits Failed 6. Bits Tested |

| Index n | Results Returned |
|--------------------------|---|
| Not specified, or n=1 | <p>(Continued)</p> <ol style="list-style-type: none"> 7. Words Failed (same as Slots for iDEN, 25 kHz WiDEN) 8. Words Tested (same as Slots for iDEN, 25 kHz WiDEN) 9. BER Test Status (0 for invalid, 1 for valid) 10. EVM (ratio) 11. EVM Max (ratio) 12. Slot location with peak EVM, counting from 0 13. Frequency Error (Hz) 14. IQ Offset (dB) 15. IQ Offset Max (dB) 16. Subchannel with peak IQ Offset, counting from 0 17. EVM Test Status (0 for fail, 1 for pass) 18. Slot Power (Vrms): If slot type is WiDEN, this gives composite power 19. Data Power (Vrms) : If slot type is WiDEN, this gives composite power 20. Relative AGC Power (dB) : If slot type is WiDEN, this gives composite power 21. Off Power (Vrms) : If slot type is WiDEN, this gives composite power 22. Relative Off Power (dB) : If slot type is WiDEN, this gives composite power 23. PvT Test Status(0 for fail, 1 for pass) <p>If the results are not available, NaN is returned.</p> |

| Index n | Results Returned |
|---------|--|
| n=2 | <p>Returns 20 comma-separated scalar results, corresponding exactly to the items in the BER Overall Summary trace:</p> <ol style="list-style-type: none"> 1. Total BER (ratio) 2. Peak BER (ratio) 3. Slot location with peak BER, counting from 0 4. Residual BER (ratio) 5. Bits Tested 6. Bits Failed 7. Words Tested (same as Slots for iDEN, 25 kHz WiDEN) 8. Words Failed (same as Slots for iDEN, 25 kHz WiDEN) 9. Words Erasure Ratio (ratio) 10. EVM (rms e.g. .03) 11. EVM Max (rms e.g. .03) 12. Slot location with Max EVM, counting from 0 13. Data Power (Vrms): If slot type is WiDEN, this gives composite power 14. Relative AGC Power Max (dB): If slot type is WiDEN, this gives composite power 15. Slot location with max Relative AGC Power, counting from 0 16. Relative AGC Power Min (dB): If slot type is WiDEN, this gives composite power 17. Slot location with min Relative AGC Power, counting from 0 18. Relative Off Power Max (dB): If slot type is WiDEN, this gives composite power 19. Slot location with Off Power Max, counting from 0 20. BER Test Status (0 for invalid, 1 for valid) <p>If the results are not available, NAN is returned.</p> |

| Index n | Results Returned |
|---------|---|
| n=3 | <p>Returns 34 comma-separated scalar results, corresponding exactly to the items in the Composite Error Summary trace:</p> <ol style="list-style-type: none"> 1. EVM ratio) 2. EVM Max (rms e.g. .03) 3. Slot location with max EVM, counting from 0 4. Sub-carrier with max EVM, counting from 0 5. EVM Peak (rms e.g. .03) 6. Symbol with peak EVM, counting from 0 7. Subchannel with peak EVM, counting from 0 8. Sub-carrier with peak EVM, counting from 0 9. Mag Err (rms e.g. .03) 10. Mag Err Peak (rms e.g. .03) 11. Subchannel with max Mag Err, counting from 0 12. Sub-carrier with max Mag Err, counting from 0 13. Mag Err Peak (% rms) 14. Symbol with peak Mag Err, counting from 0 15. Subchannel with peak Mag Err, counting from 0 16. Sub-carrier with peak Mag Err, counting from 0 17. Phase Err (degrees) 18. Phase Err Peak (degrees) 19. Subchannel with max Phase Err, counting from 0 20. Sub-carrier with max Phase Err, counting from 0 21. Phase Err Peak (degrees) 22. Symbol with peak Phase Err, counting from 0 23. Subchannel with peak Phase Err, counting from 0 24. Sub-carrier with peak Phase Err, counting from 0 25. Frequency Err (Hz) |

| Index n | Results Returned |
|---------|---|
| n=3 | <p>(Continued)</p> <ul style="list-style-type: none">26. Frequency Err Max (Hz)27. Subchannel with Max Frequency Err, counting from 028. Sub-carrier with Max Frequency Err, counting from 029. IQ Offset (dB)30. IQ Offset Max (dB)31. Subchannel with max IQ Offset, counting from 032. Sub-carrier with max IQ Offset, counting from 033. Droop Rate (dB/sym)34. EVM Test Result |

| Index n | Results Returned |
|---------|---|
| n=4 | <p>Returns 59 comma-separated scalar results, corresponding exactly to the items in the PvT Summary trace:</p> <ol style="list-style-type: none"> 1. Slot Power (Vrms) : If slot type is WiDEN, this gives composite power 2. Data Power (Vrms) : If slot type is WiDEN, this gives composite power 3. Relative Slot Power (dB) : If slot type is WiDEN, this gives composite power 4. AGC Power (Vrms) : If slot type is WiDEN, this gives composite power 5. Relative AGC Power (dB) : If slot type is WiDEN, this gives composite power 6. Off Power (Vrms) : If slot type is WiDEN, this gives composite power 7. Relative Off Power (dB) : If slot type is WiDEN, this gives composite power 8. Symbol 0 Time (sec) 9. PvT Test Result (0 for fail, 1 for pass) 10. Unused 11. Unused 12. Unused 13. Unused 14. Unused 15. Carrier Number 0, returns 0. Unused for non-WiDEN Slot Type 16. Slot Power of Carrier 0 (Vrms). Unused for non-WiDEN Slot Type 17. Data Power of Carrier 0 (Vrms), Unused for non-WiDEN Slot Type 18. Relative Slot Power of Carrier 0 (dB), Unused for non-WiDEN Slot Type 19. AGC Power of Carrier 0 (Vrms), Unused for non-WiDEN Slot Type 20. Carrier Number 1, returns 1. Unused for non-WiDEN Slot Type 21. Slot Power of Carrier 1 (Vrms). Unused for non-WiDEN Slot Type 22. Data Power of Carrier 1 (Vrms), Unused for non-WiDEN Slot Type 23. Relative Slot Power of Carrier 1 (dB), Unused for non-WiDEN Slot Type 24. AGC Power of Carrier 1 (Vrms), Unused for non-WiDEN Slot Type 25. Carrier Number 2, returns 2. Unused for non-WiDEN Slot Type 26. Slot Power of Carrier 2 (Vrms). Unused for non-WiDEN Slot Type 27. Data Power of Carrier 2 (Vrms), Unused for non-WiDEN Slot Type 28. Relative Slot Power of Carrier 2 (dB), Unused for non-WiDEN Slot Type 29. AGC Power of Carrier 2 (Vrms), Unused for non-WiDEN Slot Type 30. Carrier Number 3, returns 3. Unused for non-WiDEN Slot Type |

| Index n | Results Returned |
|---------|---|
| n=4 | <p>(Continued)</p> <p>31. Slot Power of Carrier 3 (Vrms). Unused for non-WiDEN Slot Type</p> <p>32. Data Power of Carrier 3 (Vrms), Unused for non-WiDEN Slot Type</p> <p>33. Relative Slot Power of Carrier 3 (dB), Unused for non-WiDEN Slot Type</p> <p>34. AGC Power of Carrier 3 (Vrms), Unused for non-WiDEN Slot Type</p> <p>35. Unused</p> <p>36. Unused</p> <p>37. Unused</p> <p>38. Unused</p> <p>39. Unused</p> <p>40. Carrier Number 0, returns 0. Unused for non-WiDEN Slot Type</p> <p>41. Relative AGC Power of Carrier 0 (dB). Unused for non-WiDEN Slot Type</p> <p>42. Off Power of Carrier 0 (Vrms), Unused for non-WiDEN Slot Type</p> <p>43. Relative Off Power of Carrier 0 (dB), Unused for non-WiDEN Slot Type</p> <p>44. PvT Test Result of Carrier 0. (0 for fail, 1 for pass). Unused for non-WiDEN Slot Type</p> <p>45. Carrier Number 1, returns 1. Unused for non-WiDEN Slot Type</p> <p>46. Relative AGC Power of Carrier 1 (dB). Unused for non-WiDEN Slot Type</p> <p>47. Off Power of Carrier 1 (Vrms), Unused for non-WiDEN Slot Type</p> <p>48. Relative Off Power of Carrier 1 (dB), Unused for non-WiDEN Slot Type</p> <p>49. PvT Test Result of Carrier 1. (0 for fail, 1 for pass). Unused for non-WiDEN Slot Type</p> <p>50. Carrier Number 2, returns 2. Unused for non-WiDEN Slot Type</p> <p>51. Relative AGC Power of Carrier 2 (dB). Unused for non-WiDEN Slot Type</p> <p>52. Off Power of Carrier 2 (Vrms), Unused for non-WiDEN Slot Type</p> <p>53. Relative Off Power of Carrier 2 (dB), Unused for non-WiDEN Slot Type</p> <p>54. PvT Test Result of Carrier 2. (0 for fail, 1 for pass). Unused for non-WiDEN Slot Type</p> <p>55. Carrier Number 3, returns 3. Unused for non-WiDEN Slot Type</p> <p>56. Relative AGC Power of Carrier 3 (dB). Unused for non-WiDEN Slot Type</p> <p>57. Off Power of Carrier 3 (Vrms), Unused for non-WiDEN Slot Type</p> <p>58. Relative Off Power of Carrier 3 (dB), Unused for non-WiDEN Slot Type</p> <p>59. PvT Test Result of Carrier 3. (0 for fail, 1 for pass). Unused for non-WiDEN Slot Type</p> <p>If the results are not available, -999.0 is returned.</p> |

| Index n | Results Returned |
|---------|--|
| n=5 | Returns 5 comma-separated scalar results, corresponding exactly to the items in the BER Slot Summary trace: 1. Slot BER (dBm) 2. Bits Tested 3. Bits Failed 4. BER Word 5. BER Test Status (0 for invalid, 1 for valid) If the results are not available, NAN is returned. |
| n=6 | Returns 11 comma-separated scalar results, corresponding exactly to the items in the EVM Subchannel Error Summary trace: 1. EVM (rms e.g. .03) 2. EVM Peak (rms e.g. .03) 3. Symbol with peak EVM, counting from 0 4. Mag Err (rms e.g. .03) 5. Mag Err Peak (rms e.g. .03) 6. Symbol with Peak Mag Err, counting from 0 7. Phase Err (degrees) 8. Phase Err Peak (degrees) 9. Symbol with Peak Phase Err, counting from 0 10. Frequency Err (Hz) 11. IQ Offset (dB) If no results are available, NAN is returned. |

NOTE The PvT Test Status is not included in any tables but is visible on the Instrument front panel and is also accessible using the `CALCulate:CLIMits:FAIL?` query command.

When calculating peak EVM, the pilot and sync symbol's EVM is not calculated.

In addition to these results, other results are defined in Common Functions, Data Queries, MEASure, READ, FETCh in [“:CALCulate:DATA” on page 872](#).

Key Path: **Meas**
 Mode: IDEN
 Instrument S/W Revision: A.02.00

AMPTD Y Scale

See “AMPTD Y Scale (Amplitude)” on page 746.

Auto Couple

See “**AUTO COUPLE**” on page 483 in the section "Common Measurement Functions" for more information.

BW

See “BW (Bandwidth)” on page 755.

Cont

See “[Cont \(Continuous Measurement/Sweep\)](#)” on page 503 in the section "Common Measurement Functions" for more information.

FREQ Channel

See “FREQ Channel” on page 759.

Input/Output

See “[Input/Output](#)” on page 507 in the section "Common Measurement Functions" for more information.

Marker

See “Marker” on page 763.

Marker Function

See “Marker Function” on page 782.

Marker To

See “Marker -> (Marker To)” on page 779.

Meas

See “[Meas](#)” on page 569 in the section "Common Measurement Functions" for more information.

Meas Setup

Changing any of the parameters under the Radio menu, changing test enables in the Test Selection menu, or by pressing Test Preset, will change measurement setup parameters as noted in the Coupling sections of the individual parameters.

See “[More Information about Meas Setup:](#)” on page 399.

| | |
|--------------------------|------------------------|
| Key Path: | Front-panel key |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

More Information about Meas Setup:

The first three menu softkeys are intended to be set and used in the order they appear on this menu, top to bottom. They are outlined in the following sections.

You should first set up the Radio parameters, then make the Test Selection (“[Test Selection](#)” on page 399) or selections of the Tests that you want to run, and finally perform a Test Preset (“[Test Preset](#)” on page 401), which uses what you have just selected to preset the remaining measurement parameters to a known state which should be a good starting point for your test(s).

After performing these three steps, you may want to adjust the remaining parameters for your test application.

Test Selection

The Test Selection parameters control which measurement calculations and accompanying test comparisons are enabled. Test Selection changes affect some measurement setup parameters, as noted in their Coupling descriptions.

| | |
|--------------------------|-------------------|
| Key Path: | Meas Setup |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

EVM

Enables EVM testing. The composite EVM of a signal burst is measured and compared to the EVM Test Limit.

| | |
|------------------------|--|
| Key Path: | Meas Setup, Test Selection |
| Mode: | IDEN |
| Remote Command: | [:SENSE] :IDEMod:TSEL:EVMagnitude OFF ON 0 1 [:SENSE] :IDEMod:TSEL:EVMagnitude? |

iDEN Demod Measurement Meas Setup

| | |
|--------------------------|---|
| Example: | :IDEM:TSEL:EVM ON |
| Dependencies/Couplings: | This affects parameter values as set by Test Preset (“ Test Preset ” on page 401), noted in the coupling row table entries for the affected parameters. |
| Preset: | ON |
| State Saved: | Saved in instrument state. |
| Range: | ON OFF |
| Instrument S/W Revision: | A.02.00 |

PvT

Enables PvT testing. The envelope of a slot is measured and compared to the mask for the specified slot format.

| | |
|------------------------|--|
| Key Path: | Meas Setup, Test Selection |
| Mode: | IDEN |
| Remote Command: | [:SENSE] :IDEMod:TSEL:PVTime OFF ON 0 1 [:SENSE] :IDEMod:TSEL:PVTime? |

| | |
|--------------------------|--|
| Example: | :IDEM:TSEL:PVT ON |
| Dependencies/Couplings: | This affects parameter values set by Test Preset (“ Test Preset ” on page 401), noted in the coupling row table entries for the affected parameters. |
| Preset: | ON |
| State Saved: | Saved in instrument state. |
| Range: | ON OFF |
| Instrument S/W Revision: | A.02.00 |

BER

Enables BER testing. The overall BER of a number of slots is measured and compared to the BER Test Limit.

| | |
|------------------------|--|
| Key Path: | Meas Setup, Test Selection |
| Mode: | IDEN |
| Remote Command: | [:SENSE] :IDEMod:TSEL:BERate OFF ON 0 1 [:SENSE] :IDEMod:TSEL:BERate? |
| Example: | :IDEM:TSEL:BER ON |

| | |
|--------------------------|--|
| Dependencies/Couplings: | This affects parameter values set by Test Preset (“ Test Preset ” on page 401), as noted in the coupling row table entries for the affected parameters. When the BER test is selected, the BER Slots parameter is active. This will change the minimum allowed Search Length (“ Search Length ” on page 405), as well as BER Slots (“ BER Slots ” on page 404). |
| Preset: | ON |
| State Saved: | Saved in instrument state. |
| Range: | ON OFF |
| Instrument S/W Revision: | A.02.00 |

Test Preset

The Test Preset key initializes the setup to perform the tests selected, and based on the radio setup specified. Test Preset initializes all the coupled parameters for the selected tests. This key color is green, indicating it is a preset key.

See “[More Information about Test Preset:](#)” on page 401.

| | |
|--------------------------|---|
| Key Path: | Meas Setup |
| Mode: | IDEN |
| Remote Command: | CONF : IDEMod |
| Example: | CONF:IDEM |
| Dependencies/Couplings: | This affects parameter values as detailed below. It also performs a Preset View:Test Standard (“ Preset View: Test Standard ” on page 433). |
| Instrument S/W Revision: | A.02.00 |

More Information about Test Preset:

Test Preset does not change the following parameters:

- Test selection (EVM Test, PvT Test, and/or BER Test)
- MQAM Format
- Slot Format
- Color Code
- Carrier Config

In many cases, Test Preset uses the parameters noted above to determine by their settings what other parameters will be preset to.

Parameters that will be affected by Test Preset are noted in the Couplings row in the parameter tables.

EVM Setup

The parameters in the following sections will primarily affect the functionality of the EVM measurements and EVM Test.

| | |
|--------------------------|-------------------|
| Key Path: | Meas Setup |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

Analysis Subchannel

This softkey is used to select the subchannel to be analyzed. It affects the Subchannel demodulation results (“[Subchannel Demod](#)” on page 429), and the Subchannel Error Summary table (“[Subchannel Error Summary](#)” on page 430).

Viewing the analysis of only one subchannel may identify specific signal impairments. Selecting a different analysis subchannel of the current signal acquisition, causes the analysis to be performed on that specified subchannel.

For WiDEN slot formats, the Subchannel data results are of the Analysis Subchannel chosen, of the selected “[WiDEN Carrier](#)” on page 403 (“[WiDEN Carrier](#)” on page 403).

| | |
|--------------------------|--|
| Key Path: | Meas Setup, EVM Setup |
| Mode: | IDEN |
| Remote Command: | [:SENSE] : IDEMod : ASChannel LO LI RI RO [:SENSE] : IDEMod : ASChannel ? |
| Example: | :IDEM:ASCH LO |
| Preset: | LO |
| State Saved: | Saved in instrument state. |
| Range: | 0 (LO) 1 (LI) 2 (RI) 3 (RO) |
| Instrument S/W Revision: | A.02.00 |

0 (LO) This softkey selects the first, Left Outer (LO) subchannel.

| | |
|--------------------------|---|
| Key Path: | Meas setup, EVM Setup, Analysis Subchannel |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

1 (LI) This softkey selects the second, Left Inner (LI) subchannel.

Key Path: **Meas setup, EVM Setup, Analysis Subchannel**
 Mode: IDEN
 Instrument S/W Revision: A.02.00

2 (RI) This softkey selects the third, Right Inner (RI) subchannel.

Key Path: **Meas setup, EVM Setup, Analysis Subchannel**
 Mode: IDEN
 Instrument S/W Revision: A.02.00

3 (RO) This softkey selects the fourth, Right Outer (RO) subchannel.

Key Path: **Meas setup, EVM Setup, Analysis Subchannel**
 Mode: IDEN
 Instrument S/W Revision: A.02.00

WiDEN Carrier

WiDEN Carrier is only used when WiDEN Slot Formats are active. It is ignored (grayed out) for other slot formats. It affects the Subchannel demodulation results (“[Subchannel Demod](#)” on page 429), and the Subchannel Error Summary table (“[Subchannel Error Summary](#)” on page 430). See also Analysis Subchannel (“[Analysis Subchannel](#)” on page 402).

Key Path: **Meas Setup, EVM Setup**
 Mode: IDEN
Remote Command: [:SENSe]:IDEMod:WCARrier <integer>
 [:SENSe]:IDEMod:WCARrier?
 Example: :IDEM:WCAR 0
 Preset: 0
 State Saved: Saved in instrument state.
 Min: 0
 Max: 3
 Instrument S/W Revision: A.02.00

EVM Test Limit

This is the test limit for the EVM test, in % EVM.

| | |
|--------------------------|--|
| Key Path: | Meas Setup, EVM Setup |
| Mode: | IDEN |
| Remote Command: | :CALCulate:IDEMod:EVMagnitude:LIMit:EVMLimit <real> :CALCulate:IDEMod:EVMagnitude:LIMit:EVMLimit? |
| Example: | :CALC:IDEM:EVM:LIM:EVML 10 |
| Preset: | 10 |
| State Saved: | Saved in instrument state. |
| Min: | .01 |
| Max: | 100 |
| Instrument S/W Revision: | A.02.00 |

BER Setup

The BER Setup parameters affect functionality of BER measurements and the BER Test. In addition, the Analysis Slot defines which detected slot is analyzed by the EVM and PvT Tests.

| | |
|--------------------------|-------------------|
| Key Path: | Meas Setup |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

BER Slots

BER Slots parameter is active when BER test is selected (“BER” on page 400). This parameter sets the number of slots to demodulate and measure BER. Slots with no detected burst signal will be ignored. The number of BER Slots defines the minimum allowed Search Length. See the Search Length section (“Search Length” on page 405) for details.

BER Slots also set the upper bound of the Analysis Slot. See the Analysis Slot section (“Analysis Slot” on page 406) for details.

When the BER Test is not enabled, BER Slots is clamped to 1.

| | |
|------------------------|---|
| Key Path: | Meas Setup, BER Setup |
| Mode: | IDEN |
| Remote Command: | [:SENSE]:IDEMod:SLOTs <integer> [:SENSE]:IDEMod:SLOTs? |
| Example: | :IDEM:SLOT 1 |

Dependencies/Couplings: BER Slots defines the minimum allowed Search Length (“Search Length” on page 405), and the maximum allowed Analysis Slot (“Analysis Slot” on page 406).
 Test Preset (“Test Preset” on page 401) sets this to 1 or 16, depending on whether the BER Test (“BER” on page 400) is enabled or disabled; see below.

Preset: 16

State Saved: Saved in instrument state.

Range: See table below

Instrument S/W Revision: A.02.00

Preset, Test Preset value:

| | |
|-------------------|----|
| BER Test enabled | 16 |
| BER Test disabled | 1 |

BER Test Limit

This is the test limit for the BER test, given in % BER.

Key Path: **Meas Setup, BER Setup**

Mode: IDEN

Remote Command: :CALCulate:IDEMod:BERate:LIMit:ERATe <real>
 :CALCulate:IDEMod:BERate:LIMit:ERATe

Example: :CALC:IDEM:BER:LIM:ERAT 5

Dependencies/Couplings: No

Preset: 5

State Saved: Saved in instrument state.

Min: 0

Max: 50

Instrument S/W Revision: A.02.00

Search Length

The Search Length is the time record set for acquiring the signal in making a measurement. It must be long enough to include the number of slots to be analyzed. When the Trigger is set to Free Run, it must also include the maximum expected latency time.

Search Length is preset to a length appropriate for all slots active in inbound slot formats, as detailed below. Search Length is set to a default value when the BER Test is enabled, or when the BER Slots are changed. A longer search length is necessary when the subscriber radio under test is not transmitting in

iDEN Demod Measurement Meas Setup

every slot in each frame. If a sparse frame is transmitted, increasing the Search Length will ensure enough slots are captured to satisfy the BER Slots requirement for inbound slot formats.

| | |
|--------------------------|---|
| Key Path: | Meas Setup |
| Mode: | IDEN |
| Remote Command: | [:SENSE] :IDEMod:SYNC:SLENgth <time> [:SENSE] :IDEMod:SYNC:SLENgth? |
| Example: | :IDEM:SYNC:SLEN .260 |
| Dependencies/Couplings: | When user change the BER Slots parameter, the search length will be adjusted according to it. |
| Preset: | 260 ms |
| Min: | 35 ms |
| Max: | 2 s |
| Instrument S/W Revision: | A.02.00 |

Default Search Length - assumes that the slots are as densely packed as possible, as in the case of outbound slot formats.

| | BER Test enabled | BER Test disabled |
|--|--|--|
| BER Slots default | 16 | 1 |
| Search Length | $15 * (\text{BER Slots} + 1) + 5 \text{ ms}$ | $15 * (\text{BER Slots} + 1) + 5 \text{ ms}$ |
| Search Length at default number of BER Slots | 260 ms | 35 ms |

Analysis Slot

The Analysis Slot selects the slot analyzed in the BER Slot Summary data result. It also specifies the slot analyzed for all other single slot data results, such as the EVM results and PvT results. Changing the analysis slot causes the analysis to be performed on that newly specified slot of the current signal acquisition.

Analysis Slot range is from 0 to BER Slots–1, where each value is a different slot in the BER acquisition. When the BER Test is not enabled, the Analysis Slot is clamped to slot 0.

| | |
|------------------------|---|
| Key Path: | Meas Setup, BER Setup |
| Mode: | IDEN |
| Remote Command: | [:SENSE] :IDEMod:ASLot <integer> [:SENSE] :IDEMod:ASLot? |
| Example: | :IDEM:ASL 0 |

| | |
|--------------------------|-------------------------------------|
| Dependencies/Couplings: | Maximum is limited to BER Slots – 1 |
| Preset: | 0 |
| State Saved: | Saved in instrument state. |
| Min: | 0 |
| Max: | 31 |
| Instrument S/W Revision: | A.02.00 |

Avg Number

Sets the number of time records whose measurement results will be averaged. For more information, see [“Avg Number” on page 790](#).

| | |
|--------------------------|--|
| Key Path: | Meas Setup, More |
| Mode: | IDEN |
| Dependencies/Couplings: | Test Preset (“Test Preset” on page 401) sets to 20 |
| Preset: | On, 20 |
| Instrument S/W Revision: | A.02.00 |

Average Mode

Average Mode controls the averaging method when the Sweep Control is in Continuous mode and the number of time records processed exceeds the Average Number (see above). When Sweep Control is in Single mode, Average Mode has no effect. For more information, see [“Average Mode” on page 791](#).

| | |
|--------------------------|---|
| Key Path: | Meas Setup, More |
| Mode: | IDEN |
| Dependencies/Couplings: | Test Preset (“Test Preset” on page 401) sets to EXPonential |
| Preset: | EXPonential |
| Instrument S/W Revision: | A.02.00 |

Average Setup

Access a menu allowing you to set Averaging parameters for all VSA based measurements. There are no SCPI/features unique to this measurement. For more information, see [“Average Setup” on page 792](#).

| | |
|--------------------------|-------------------------|
| Key Path: | Meas Setup, More |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

Average Type

The Average Type softkey menu allows you to select the type of averaging. For more information, see [“Average Type” on page 792](#).

| | |
|--------------------------|---|
| Key Path: | Meas Setup, More, Average Setup |
| Mode: | IDEN |
| Dependencies/Couplings: | Test Preset (“Test Preset” on page 401) sets to RMS |
| Preset: | RMS |
| Instrument S/W Revision: | A.02.00 |

RMS

This softkey selects the RMS Average Type. For more information, see [“Average Type” on page 792](#).

| | |
|--------------------------|--|
| Key Path: | Meas Setup, Average Setup, Average Type |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

Time

This softkey selects the Time Average Type. For more information, see [“Average Type” on page 792](#).

| | |
|--------------------------|--|
| Key Path: | Meas Setup, Average Setup, Average Type |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

Max

This softkey selects the Max Average Type. For more information, see [“Average Type” on page 792](#).

| | |
|--------------------------|--|
| Key Path: | Meas Setup, Average Setup, Average Type |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

Fast Average

Fast Average controls the display updates of average data. For more information, see [“Fast Average” on page 793](#).

| | |
|-------------------------|---|
| Key Path: | Meas Setup, More, Average Setup |
| Mode: | IDEN |
| Dependencies/Couplings: | Test Preset (“Test Preset” on page 401) sets to OFF |

Preset: OFF
 Instrument S/W Revision: A.02.00

Update Rate

The Update Rate controls how often the display updates when fast averaging is turned on. For more information, see [“Update Rate” on page 793](#).

Key Path: **Meas Setup, More, Average Setup**
 Mode: IDEN
 Dependencies/Couplings: Test Preset ([“Test Preset” on page 401](#)) sets to Manual, 20
 Preset: Auto, 20
 Instrument S/W Revision: A.02.00

Extend Freq Lock Range

When "ON" is chosen for this parameter, the demodulation algorithm allows for the modulation not being closely centered on the Center Frequency. Turn this parameter OFF only in special cases where specific data patterns cause display instabilities.

Key Path: **Meas Setup, More**
 Mode: IDEN
Remote Command: [:SENSe] : IDEMod : EFLock OFF | ON | 0 | 1
 [:SENSe] : IDEMod : EFLock?
 Example: :IDEM:EFL ON
 Dependencies/Couplings: Set to ON by Test Preset ([“Test Preset” on page 401](#))
 Preset: ON
 State Saved: Saved in instrument state.
 Range: OFF | ON
 Instrument S/W Revision: A.02.00

Normalize

Setting this parameter to ON will result in the constellation diagram and other absolute demodulation results being normalized to a nominal 1.0 value. When set to OFF, results are presented in absolute units. This parameter will also affect the PvT trace. When normalize is ON, the PvT trace will be the normalized by the data power. If it's OFF, the PvT trace will contain absolute value.

Key Path: **Meas Setup, More**
 Mode: IDEN

iDEN Demod Measurement Meas Setup

| | |
|--------------------------|--|
| Remote Command: | [:SENSe] : IDEMod : NORMAlize : STATe OFF ON 0 1 [:SENSe] : IDEMod : NORMAlize : STATe? |
| Example: | :IDEM:NORM:STAT ON |
| Dependencies/Couplings: | Set to ON by Test Preset ((“Test Preset” on page 401)) |
| Preset: | ON |
| State Saved: | Saved in instrument state. |
| Range: | OFF ON |
| Instrument S/W Revision: | A.02.00 |

Advanced

This softkey menu selection accesses advanced demodulation controls that are not commonly used. These menu selections are defined in the following sections.

| | |
|--------------------------|-------------------------|
| Key Path: | Meas Setup, More |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

Filter Alpha

This softkey sets the Root Raised Cosine (RRC) demodulation receive filter alpha parameter. It is preset per the test standards.

| | |
|--------------------------|--|
| Key Path: | Meas Setup, More, Advanced |
| Mode: | IDEN |
| Remote Command: | [:SENSe] : IDEMod : ALPHa <real> [:SENSe] : IDEMod : ALPHa? |
| Example: | :IDEM:ALPH .2 |
| Dependencies/Couplings: | Set to .2 by Test Preset |
| Preset: | .2 |
| State Saved: | Saved in instrument state. |
| Min: | .05 |
| Max: | 1.0 |
| Instrument S/W Revision: | A.02.00 |

Time Scale Factor

The Time Scale Factor key allows you to scale the timebase of a signal, or a debug environment where the symbol rate and DAC (Digital to Analog Converter) clocking is scaled at a faster or slower rate. For example, you can scale a test signal with a symbol rate of 4Hz instead of 4000Hz by entering: Time Scale Factor = 0.001, which results in a closer analysis.

| | |
|--------------------------|--|
| Key Path: | Meas Setup, More, Advanced |
| Mode: | IDEN |
| Remote Command: | [:SENSe] :IDEMod:TSCale <real> [:SENSe] :IDEMod:TSCale? |
| Example: | :IDEM:TSC 1.0 |
| Dependencies/Couplings: | Test Preset is 1.0. Will change Span |
| Preset: | 1.0 |
| State Saved: | Saved in instrument state. |
| Min: | .1 |
| Max: | 1000 |
| Instrument S/W Revision: | A.02.00 |

Sync/Pilot Symbols

When this softkey selection is On, the EVM calculations will include the Sync and Pilot Symbols. When Off, these symbols will not be included in the EVM calculations.

| | |
|--------------------------|--|
| Key Path: | Meas Setup, More, Advanced |
| Mode: | IDEN |
| Remote Command: | [:SENSe] :IDEMod:SPSYmbols:INCLude OFF ON 0 1 [:SENSe] :IDEMod:SPSYmbols:INCLude? |
| Example: | :IDEM:SPSY:INCL OFF |
| Dependencies/Couplings: | Test Preset set this to Off. |
| Preset: | OFF |
| State Saved: | Saved in instrument state. |
| Range: | OFF ON |
| Instrument S/W Revision: | A.02.00 |

Droop

When this softkey selection is On, droop correction will be applied to the EVM calculations. When Off, it will not be applied and droop errors will be included in EVM results.

| | |
|--------------------------|--|
| Key Path: | Meas Setup, More, Advanced |
| Mode: | IDEN |
| Remote Command: | [:SENSe] : IDEMod : ADRoop : COMPensation OFF ON 0 1 [:SENSe] : IDEMod : ADRoop : COMPensation? |
| Example: | :IDEM:ADR:COMP ON |
| Dependencies/Couplings: | Test Preset sets this to ON |
| Preset: | ON |
| State Saved: | Saved in instrument state. |
| Range: | OFF ON |
| Instrument S/W Revision: | A.02.00 |

Pilot Tracking

This softkey sets whether or not to include Pilot Tracking in Error Vector Magnitude (EVM) calculations and adjust constellation diagrams.

When Pilot Tracking is set to On, the analyzer uses the predicted locations of the pilot symbols compared to the actual pilot symbol locations. It then adds phase/amplitude corrections to better position the actual pilot symbols at the predicted locations. This generally results in improved EVM measurement accuracy.

| | |
|--------------------------|--|
| Key Path: | Meas Setup, More, Advanced |
| Mode: | IDEN |
| Remote Command: | [:SENSe] : IDEMod : PILot : TRACk OFF ON 0 1 [:SENSe] : IDEMod : PILot : TRACk? |
| Example: | :IDEM:PIL:TRAC OFF |
| Dependencies/Couplings: | Test Preset set this to OFF. |
| Preset: | OFF |
| State Saved: | Saved in instrument state. |
| Range: | OFF ON |
| Instrument S/W Revision: | A.02.00 |

Mode

See “Mode” on page 587.

Mode Setup

See “Mode Setup” on page 601.

Peak Search

See “Peak Search” on page 795.

Recall

See “[Recall](#)” on page 611 in the section "Common Measurement Functions" for more information.

Restart

See [“Restart” on page 633](#) in the section "Common Measurement Functions" for more information.

Save

See “[Save](#)” on page 635 in the section "Common Measurement Functions" for more information.

Single

See “[Single \(Single Measurement/Sweep\)](#)” on page 661 in the section "Common Measurement Functions" for more information.

Source

The Source function is not available for this mode.

| | |
|--------------------------|------------------------|
| Key Path: | Front-panel key |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

SPAN X Scale

There are no measurement unique SCPI/features, however, the Span can be controlled by other measurement parameters and couplings.

See “[SPAN X Scale](#)” on page 800.

Key Path: **Front-panel key**
 Mode: IDEN
 Instrument S/W Revision: A.02.00

Span

This softkey sets the frequency Span of the measurement. For more information, see “[Span](#)” on page 800.

Key Path: **SPAN X Scale**
 Mode: IDEN
 Dependencies/Couplings: Test Preset, changes to Carrier Config, and some changes to Slot Format cause the Span to be changed as detailed in the table below. Span is also scaled by Time Scale Factor.
 Preset: 30 kHz
 Instrument S/W Revision: A.02.00

Default Span vs Slot Format and Carrier Config:

| | | | | | | |
|----------------|----------|---------|--------|---------|---------|--------------|
| Slot Format | All iDEN | WiDEN | WiDEN | WiDEN | WiDEN | WiDEN |
| Carrier Config | | 25 kHz, | 50 kHz | 75 kHz | 100 kHz | Outer 50 kHz |
| Span | 60 kHz | 60 kHz | 85 kHz | 110 kHz | 135 kHz | 135 kHz |

Sweep/Control

See “Sweep / Control” on page 665.

Trace/Detector

This softkey accesses a menu allowing you to select various trace and detector parameters for the current measurement.

Key Path: **Front-panel key**
 Mode: IDEN
 Instrument S/W Revision: A.02.00

Data

This accesses a menu of Trace data choices for the selected trace. For more information, see [“Data” on page 811](#).

Key Path: **Trace/Detector**
 Mode: IDEN
 Instrument S/W Revision: A.02.00

The following are the SCPI string forms for the Data types that are specific to this measurement:

| Trace data soft key name | SCPI string form |
|--------------------------|--------------------------|
| Spectrum | "Spectrum1" |
| Inst Spectrum | "Inst Spec1" |
| Search Time | "Search Time1" |
| Time | "Time1" |
| Raw Main Time | "Raw Main Time1" |
| PVT Time | "PVT Time1" |
| PVT Summary | "PVT Summary1" |
| WiDEN Carr0 PvT Time | "PvT WIDEN CARR0 Time1" |
| WiDEN Carr1 PvT Time | "PvT WIDEN CARR1 Time1" |
| WiDEN Carr2 PvT Time | "PvT WIDEN CARR2Time1" |
| WiDEN Carr3 PvT Time | "PvT WIDEN CARR3 Time1" |
| BER Overall Summary | "BER Overall Summary1" |
| BER Slot Summary | "BER Slot Summary1" |
| Overlaid IQ Meas Time | "Overlaid IQ Meas Time1" |

**iDEN Demod Measurement
Trace/Detector**

| Trace data soft key name | SCPI string form |
|---------------------------------|-----------------------------------|
| Overlaid IQ Ref Time | "Overlaid IQ Ref Time1" |
| Overlaid Error Vector Time | "Overlaid Error Vector Time1" |
| Overlaid Error Vector Spectrum | "Overlaid Error Vector Spectrum1" |
| Overlaid IQ Mag Error | "Overlaid IQ Mag Error1" |
| Overlaid IQ Phase Error | "Overlaid IQ Phase Error1" |
| Subchannel IQ Meas Time | "Subchan IQ Meas Time1" |
| Subchannel IQ Ref Time | "Subchan IQ Ref Time1" |
| Subchannel Error Vector Time | "Subchan Error Vector Time1" |
| Subchannel IQ Mag Error | "Subchan Error Vector Spectrum1" |
| Subchannel IQ Phase Error | "Subchan IQ Mag Error1" |
| Composite Error Summary | "Comp Error Summary1" |
| Composite Symbols | "Comp Syms1" |
| Subchannel Error Summary | "Subchan Error Summary1" |
| MQAM Summary | "MQAM Summary1" |

Pre Demod

This softkey accesses several Trace Data types which show results prior to demodulation.

Key Path: **Trace/Detector, Data**
Mode: IDEN
Instrument S/W Revision: A.02.00

Spectrum

Shows the frequency spectrum of the signal, scaled to the display and averaged if averaging is on.

Key Path: **Trace/Detector, Data, Pre Demod**
Mode: IDEN
Instrument S/W Revision: A.02.00

Inst Spectrum

Displays the most recent spectrum measurement of your signal, scaled to the display.

Key Path: **Trace/Detector, Data, Pre Demod**
Mode: IDEN

Instrument S/W Revision: A.02.00

Search Time

Shows the time-data before pulse search and demodulation, that is, shows the acquired time data used to search for the pulse (or burst).

Key Path: **Trace/Detector, Data, Pre Demod**

Mode: IDEN

Instrument S/W Revision: A.02.00

Time

Shows the block of time-record samples of the signal waveform, from which time, frequency, and modulation domain data is derived.

Key Path: **Trace/Detector, Data, Pre Demod**

Mode: IDEN

Instrument S/W Revision: A.02.00

Raw Main Time

Shows the raw data acquired from the input hardware. 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: IDEN

Instrument S/W Revision: A.02.00

PvT

This softkey brings up a menu for a number of Trace Data types which show PvT specific results.

Key Path: **Trace/Detector, Data**

Mode: IDEN

Instrument S/W Revision: A.02.00

PvT Time

Shows a non-complex time display of the full slot with time = 0 referenced to the first data symbol.

Key Path: **Trace/Detector, PvT**

Mode: IDEN

iDEN Demod Measurement Trace/Detector

Instrument S/W Revision: A.02.00

PvT Summary

Shows a summary of the composite signal (all subchannels) for elements of the slot format, overall slot power, data, AGC, and power off levels. Note that the PvT Test Status is not included in this table but is visible on the front panel and is accessible via the CALCulate:CLIMits:FAIL? query.

Key Path: **Trace/Detector, PvT**

Mode: IDEN

Instrument S/W Revision: A.02.00

WiDEN Carr0 PvT Time

Shows a non-complex time display of the full slot with time = 0 referenced to the first data symbol.

Key Path: **Trace/Detector, PvT**

Mode: IDEN

Instrument S/W Revision: A.02.00

WiDEN Carr1 PvT Time

Shows a non-complex time display of the full slot with time = 0 referenced to the first data symbol.

Key Path: **Trace/Detector, PvT**

Mode: IDEN

Instrument S/W Revision: A.02.00

WiDEN Carr2 PvT Time

Shows a non-complex time display of the full slot with time = 0 referenced to the first data symbol.

Key Path: **Trace/Detector, PvT**

Mode: IDEN

Instrument S/W Revision: A.02.00

WiDEN Carr3 PvT Time

Shows a non-complex time display of the full slot with time = 0 referenced to the first data symbol.

Key Path: **Trace/Detector, PvT**

Mode: IDEN

Instrument S/W Revision: A.02.00

BER

This softkey accesses a number of Trace Data types which are BER specific tables.

Key Path: **Trace/Detector, Data**
Mode: IDEN
Instrument S/W Revision: A.02.00

BER Overall Summary

Shows a trace of an overall Bit Error Rate (BER).

Key Path: **Trace/Detector, BER**
Mode: IDEN
Instrument S/W Revision: A.02.00

BER Slot Summary

Shows a trace for a visual representation of Bit Error Rate (BER) symbol errors within an overall slot.

Key Path: **Trace/Detector, BER**
Mode: IDEN
Instrument S/W Revision: A.02.00

Overlaid Demod

This key brings up a number of Trace Data types which show demodulation results for all subchannels on a single display.

Key Path: **Trace/Detector, Data**
Mode: IDEN
Instrument S/W Revision: A.02.00

Overlaid IQ Meas Time

Displays all sub-carrier symbols. In a constellation diagram, the symbols are overlaid on an ideal state pattern with circles for data symbols and cross-marks for sync and pilot symbols.

Key Path: **Trace/Detector, Overlaid Demod**
Mode: IDEN
Instrument S/W Revision: A.02.00

Overlaid IQ Ref Time

iDEN Demod Measurement Trace/Detector

Shows the sequence of ideal I and Q states as a composite of all sub-carriers.

Key Path: **Trace/Detector, Overlaid Demod**
Mode: IDEN
Instrument S/W Revision: A.02.00

Overlaid Error Vector Time

Displays error vector time for every subchannel symbol on a symbol by symbol basis (vertical green line), overlaid with a white trace that shows the average error vector time per symbol (LinMag or LogMag scale only).

Key Path: **Trace/Detector, Overlaid Demod**
Mode: IDEN
Instrument S/W Revision: A.02.00

Overlaid Error Vector Spectrum

Displays all of the iDEN/WiDEN subchannels as green vertical lines, with each green vertical line containing all the symbols for a subchannel, and the entire display overlaid with a white trace (LinMag or LogMag scale only) showing the average vector error of each subchannel.

Key Path: **Trace/Detector, Overlaid Demod**
Mode: IDEN
Instrument S/W Revision: A.02.00

Overlaid IQ Mag Error

Displays the IQ magnitude error for every subchannel symbol on a symbol by symbol basis, overlaid with a white trace (LinMag or LogMag scale only) that shows the average IQ magnitude error per symbol.

Key Path: **Trace/Detector, Overlaid Demod**
Mode: IDEN
Instrument S/W Revision: A.02.00

Overlaid IQ Phase Error

Displays the IQ phase error for every sub-carrier symbol, on a symbol-by-symbol basis. The display is overlaid with a white trace identifying the average IQ phase error per symbol.

Key Path: **Trace/Detector, Overlaid Demod**
Mode: IDEN

Instrument S/W Revision: A.02.00

Subchannel Demod

This softkey accesses a number of Trace Data types which show demodulation results for the single subchannel selected by Analysis Subchannel (“[Analysis Subchannel](#)” on page 402) and WiDEN Carrier (“[WiDEN Carrier](#)” on page 403).

Key Path: **Trace/Detector, Data**

Mode: IDEN

Instrument S/W Revision: A.02.00

Subchannel IQ Meas Time

Displays all symbols for the selected subchannel, overlaid using an ideal state pattern. Circles are used to identify data symbols and cross-marks for sync and pilot symbols.

Key Path: **Trace/Detector, Subchannel Demod**

Mode: IDEN

Instrument S/W Revision: A.02.00

Subchannel IQ Ref Time

Shows a sequence of ideal I and Q states for the specified subchannel.

Key Path: **Trace/Detector, Subchannel Demod**

Mode: IDEN

Instrument S/W Revision: A.02.00

Subchannel Error Vector Time

Displays error vector time for the specified subchannel on a symbol-by-symbol basis.

Key Path: **Trace/Detector, Subchannel Demod**

Mode: IDEN

Instrument S/W Revision: A.02.00

Subchannel IQ Mag Error

Displays the IQ magnitude time error for the selected subchannel on a symbol-by-symbol basis.

Key Path: **Trace/Detector, Subchannel Demod**

Mode: IDEN

Instrument S/W Revision: A.02.00

Subchannel IQ Phase Error

Displays the IQ phase error for the selected subchannel on a symbol-by-symbol basis.

Key Path: **Trace/Detector, Subchannel Demod**

Mode: IDEN

Instrument S/W Revision: A.02.00

Tables

This softkey accesses a menu selection for a number of tabular Trace Data types: Composite Error Summary, Composite Symbols, Subchannel Error Summary, and MQAM Summary.

Key Path: **Trace/Detector, Data**

Mode: IDEN

Instrument S/W Revision: A.02.00

Composite Error Summary

Displays an error summary for the composite iDEN/WiDEN signal, which includes all valid subchannels.

Key Path: **Trace/Detector, Tables**

Mode: IDEN

Instrument S/W Revision: A.02.00

Composite Symbols

Displays all the demodulated symbols for the selected slot format.

Key Path: **Trace/Detector, Tables**

Mode: IDEN

Instrument S/W Revision: A.02.00

Subchannel Error Summary

Shows an error summary for the subchannel selected by Analysis Subchannel and WiDEN Carrier.

Key Path: **Trace/Detector, Tables**

Mode: IDEN

Instrument S/W Revision: A.02.00

MQAM Summary Shows a summary of EVM, PvT, and BER Test results.

Key Path: **Trace/Detector, Tables**
Mode: IDEN
Instrument S/W Revision: A.02.00

ACP

Key Path: **Trace/Detector, Data, More**
Mode: IDEN
Instrument S/W Revision: A.02.00

OBW

Key Path: **Trace/Detector, Data, More**
Mode: IDEN
Instrument S/W Revision: A.02.00

Register

Key Path: **Trace/Detector, Data, More**
Mode: IDEN
Instrument S/W Revision: A.02.00

No Data

Key Path: **Trace/Detector, Data, More**
Mode: IDEN
Instrument S/W Revision: A.02.00

Trigger

See “Trigger” on page 850.

View / Display

After Test Preset, the layout will include two windows for each test enabled. The view layout will be 2, 4 or 6 windows. If no tests are enabled, the view layout will be two windows with the IQ Meas Time constellation in trace 1, and the MQAM Summary Trace in trace 2.

When the EVM test is enabled, and Test Preset is pressed, the IQ Meas Time constellation in trace 1, and the EVM Composite Summary trace will be displayed in trace 2.

When the PvT test is enabled, and Test Preset is pressed, the PvT Time trace will be displayed in trace 3, and the PvT Summary trace will be displayed in trace 4.

When the BER test is enabled, and Test Preset is pressed, the BER Slot Summary trace will be displayed in trace 5, and the BER Overall Summary trace will be displayed in trace 6.

The view setup can be changed by selections from the View/Display menu, or by pressing Test Preset after enabling the desired tests, or by individually selecting traces and layout. The user may change the number of windows in the layout, or the contents of those windows.

The Preset View softkeys perform an immediate action of changing the layout and view for various Preset Views unique to this measurement. These Preset Views are actions, not states.

| | |
|--------------------------|------------------------|
| Key Path: | Front-panel key |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

Display

See [“Display” on page 735](#) in the "Common Measurement Functions" section for more information.

Layout

See [“Layout” on page 865](#).

Preset View: Test Standard

Preset the display layout to pre-defined patterns.

| | |
|------------------------|--|
| Key Path: | View/Display |
| Remote Command: | :DISPlay:IDEMod:VIEW:PRESet TSTD PVTBOTH EVMQUAD EVMSYMS WPVT |
| Example: | :DISP:IDEM:VIEW:PRES TSTD |

iDEN Demod Measurement View / Display

| | |
|--------------------------|---|
| Notes: | Command Only. TSTD: Test Standard PVTBOTH: PvT Rise & Fall EVMQUAD: EVM(Quad) EVMSYMS: EVM & Symbols WPVT: WiDEN PvT |
| Dependencies/Couplings: | Action dependent on the state of the several test enables |
| Instrument S/W Revision: | A.02.00 |

Preset View: PvT Rise & Fall

Preset the display layout to pre-defined patterns.

| | |
|--------------------------|---|
| Key Path: | View/Display |
| Example: | :DISP:IDEM:VIEW:PRES PVTBOTH |
| Notes: | Command Only. TSTD: Test Standard PVTBOTH: PvT Rise & Fall EVMQUAD: EVM(Quad) EVMSYMS: EVM & Symbols WPVT: WiDEN PvT |
| Dependencies/Couplings: | Action dependent on the state of the several test enables |
| Instrument S/W Revision: | A.02.00 |

Preset View: EVM (Quad)

Preset the display layout to pre-defined patterns.

| | |
|-------------------------|---|
| Key Path: | View/Display |
| Example: | :DISP:IDEM:VIEW:PRES EVMQUAD |
| Notes: | Command Only. TSTD: Test Standard PVTBOTH: PvT Rise & Fall EVMQUAD: EVM(Quad) EVMSYMS: EVM & Symbols WPVT: WiDEN PvT |
| Dependencies/Couplings: | Action dependent on the state of the several test enables |

Instrument S/W Revision: A.02.00

Preset View: EVM & Symbols

Preset the display layout to pre-defined patterns.

Key Path: **View/Display**
Example: :DISP:IDEM:VIEW:PRES EVMSYMS

Notes: Command Only.
TSTD: Test Standard
PVTBOTH: PvT Rise & Fall
EVMQUAD: EVM(Quad)
EVMSYMS: EVM & Symbols
WPVT: WiDEN PvT

Dependencies/Couplings: Action dependent on the state of the several test enables

Instrument S/W Revision: A.02.00

Preset View: WiDEN PvT

Preset the display layout to pre-defined patterns.

Key Path: **View/Display**
Example: :DISP:IDEM:VIEW:PRES WPVT

Notes: Command Only.
TSTD: Test Standard
PVTBOTH: PvT Rise & Fall
EVMQUAD: EVM(Quad)
EVMSYMS: EVM & Symbols
WPVT: WiDEN PvT

Dependencies/Couplings: Action dependent on the state of the several test enables

Instrument S/W Revision: A.02.00

Measurement Results and Views

Front Panel Results

There are three sets of test results combined into this measurement. Each set of results has limit testing to provide a Pass or Fail test result.

- Modulation Quality Test and Measurement Results

Several EVM results are available, including constellations, EVM versus time, EVM summary trace, etc. The EVM Test Limit is settable.

- Bit Error Rate Test and Measurement Results

Typical Glacier style BER results are available, including a summary trace with symbols for a user-selected analysis slot, and an overall BER summary. The BER Test Limit is settable.

- Power Versus Time Test and Measurement Results

The PvT trace has slot format specific limit lines. Note that 0.0 is the symbol time of the first modulated symbol.

Result Views

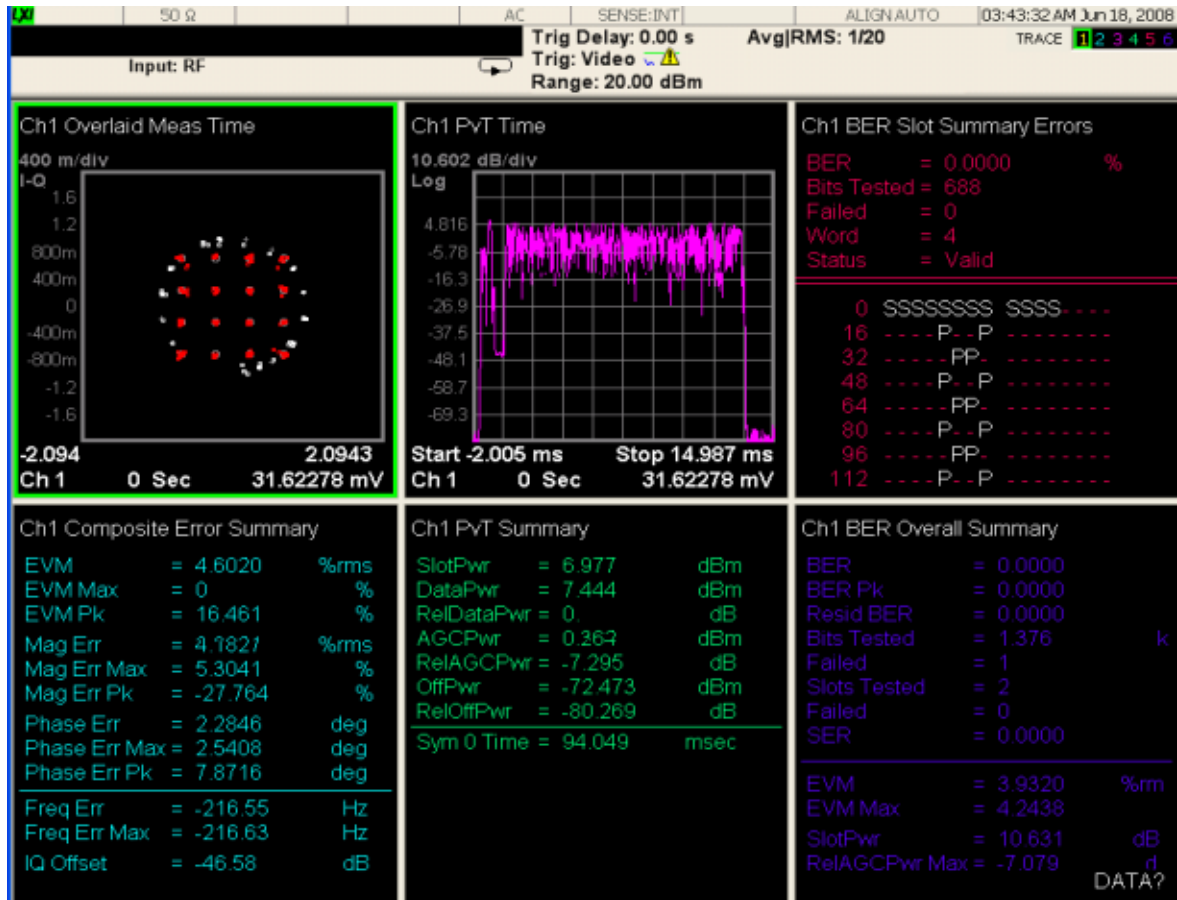
There are five views. As follows:

View - Preset View: Test Standard The Test Standard view provides the preset view for the set of selected tests, as defined in the Test Selection section. The exact action is dependent on the test selections.

The action performed is detailed in the table below.

- If no Test is selected the Display Layout will be "Stack 2", with the two traces shown in the "EVM or none" column.
- If a single test is selected, the Display Layout will be "Stack 2", with the two traces shown in the column below the Test.
- If Two tests are selected, the Display Layout will be "Grid 2x2", with the four traces shown in the same location as in the table below if you remove the column for the unused Test.
- If all three Tests are selected, the Display Layout will be "Grid 2x3", with the six traces shown in the same location as in the table below.

| EVM or none | PvT | BER |
|--|-------------------------|---------------------------------|
| Trace 1: IQ Meas Time constellation | Trace 3: PvT Time | Trace 5: BER Slot Summary |
| Trace 2: EVM Composite Summary | Trace 4: PvT Summary | Trace 6: BER Overall Summary |



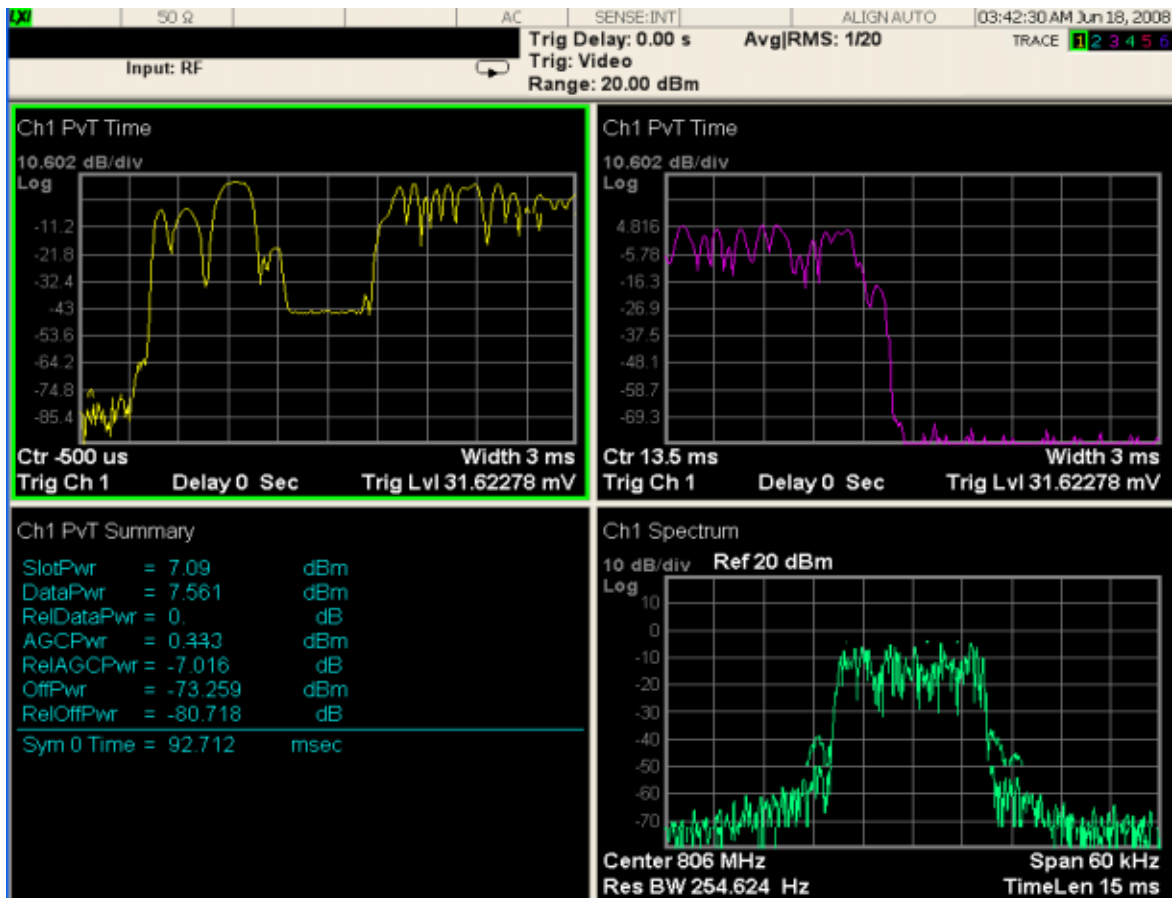
iDEN Demod Measurement
View / Display

View - Preset View: PvT Rise & Fall The PvT Rise & Fall view configures a 4 pane layout. Traces 1 displays the rising edge, and trace 3 displays the falling edge, of the iDEN burst. Those traces are setup using X-axis scaled parts of the PVT Time Meas Data. Trace 2 displays the PVT Summary. Trace 4 displays the Spectrum trace.

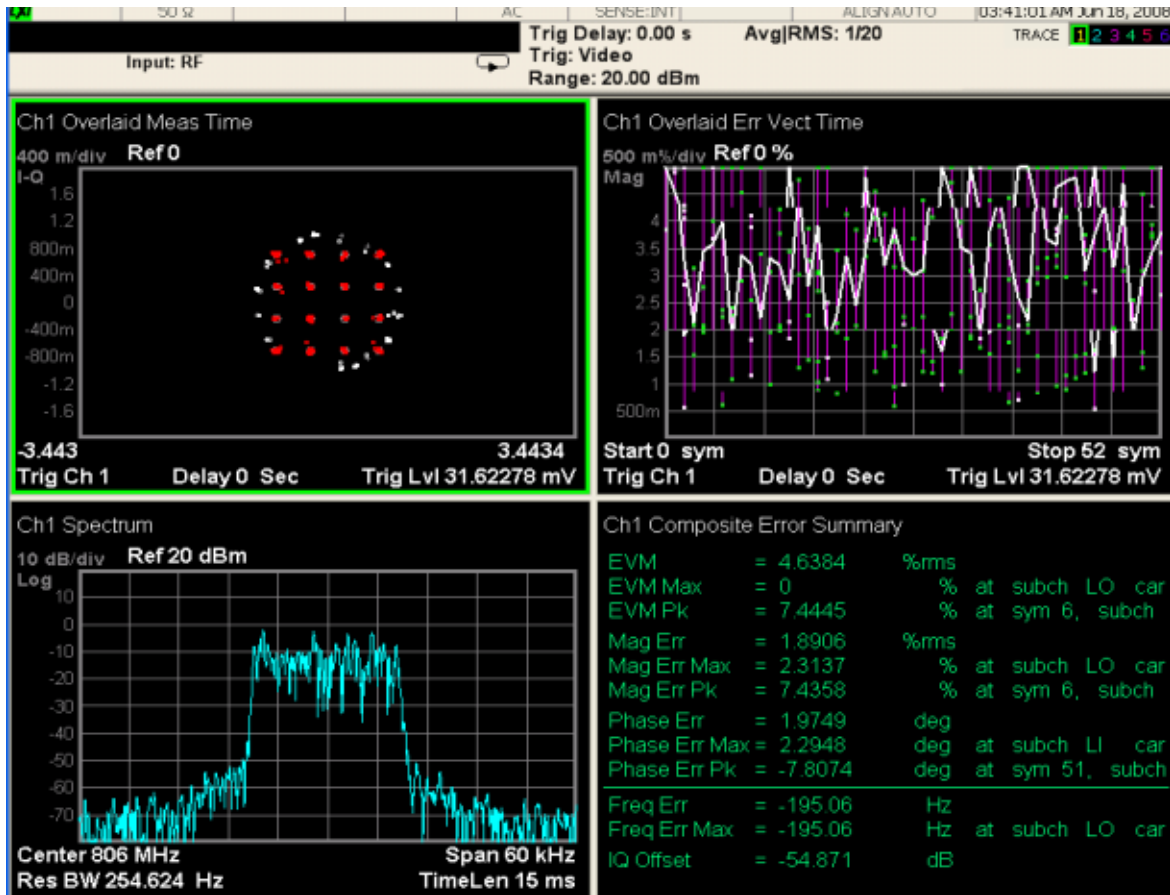
The default X-axis scaling setup for the PvT Time traces in the PvT Rise & Fall view is a function of the slot format.

For viewing consistency, the X-scale length is 3 ms in all cases. Note that 0.0 is the symbol time of the first modulated symbol.

| Slot Format | Inbound Reserved, Enhanced 6:1, WiDEN | Inbound New 6:1 | Inbound New 6:1 with Training | Inbound Random Access | Outbound |
|---------------------|---------------------------------------|-----------------|-------------------------------|-----------------------|----------|
| Rise Window - Start | -2 ms | -1 ms | -2 ms | -2 ms | -2 ms |
| Rise Window - Stop | 1 ms | 2 ms | 1 ms | 1 ms | 1 ms |
| Fall Window - Start | 12 ms | 5.5 ms | 4.5 ms | 3.75 ms | 14 ms |
| Fall Window - Stop | 15 ms | 8.5 ms | 7.5 ms | 6.75 ms | 17 ms |

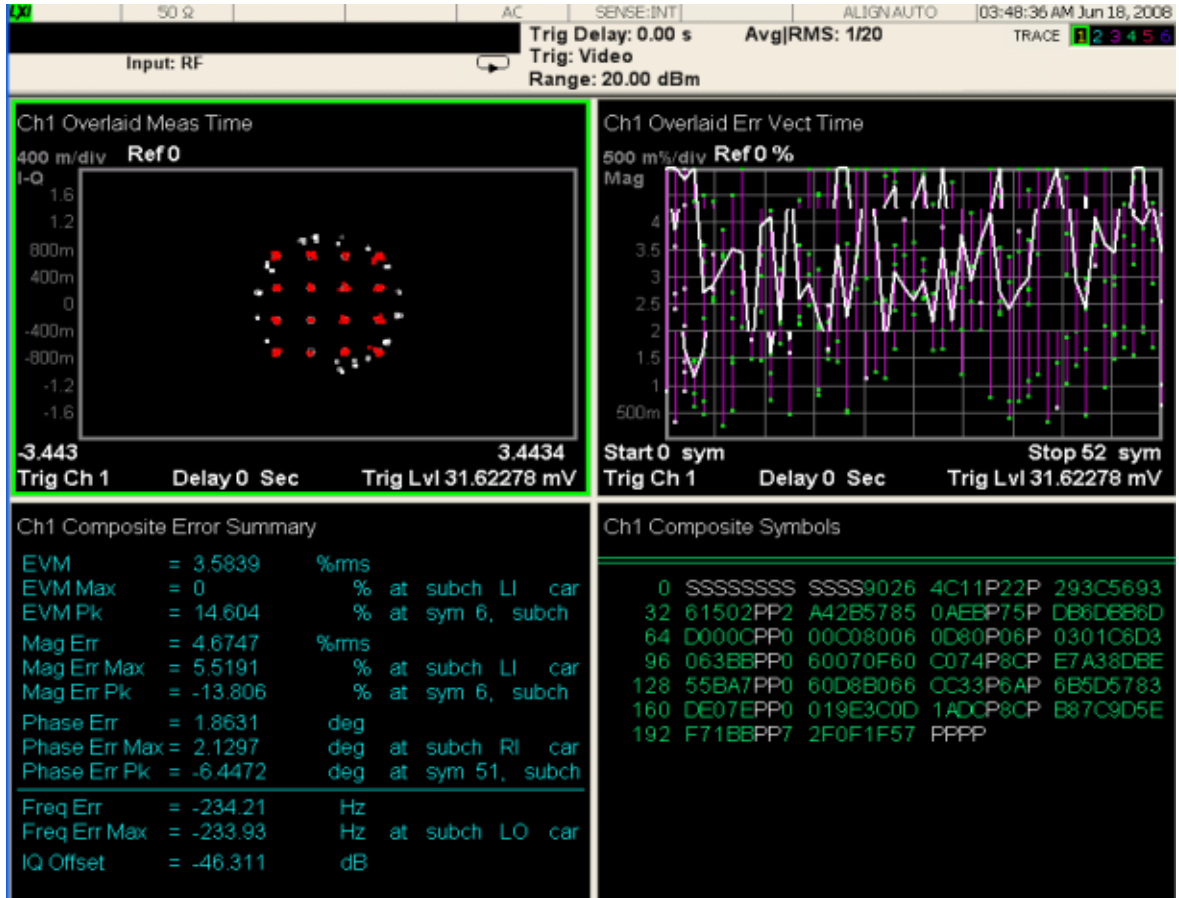


View - Preset View: EVM (Quad) The EVM (Quad) view configures a 4 pane layout showing the constellation in Trace 1, the Spectrum in Trace 2, the Err Vect Time in Trace 3, and EVM statistics in the Composite Error Summary in Trace 4.

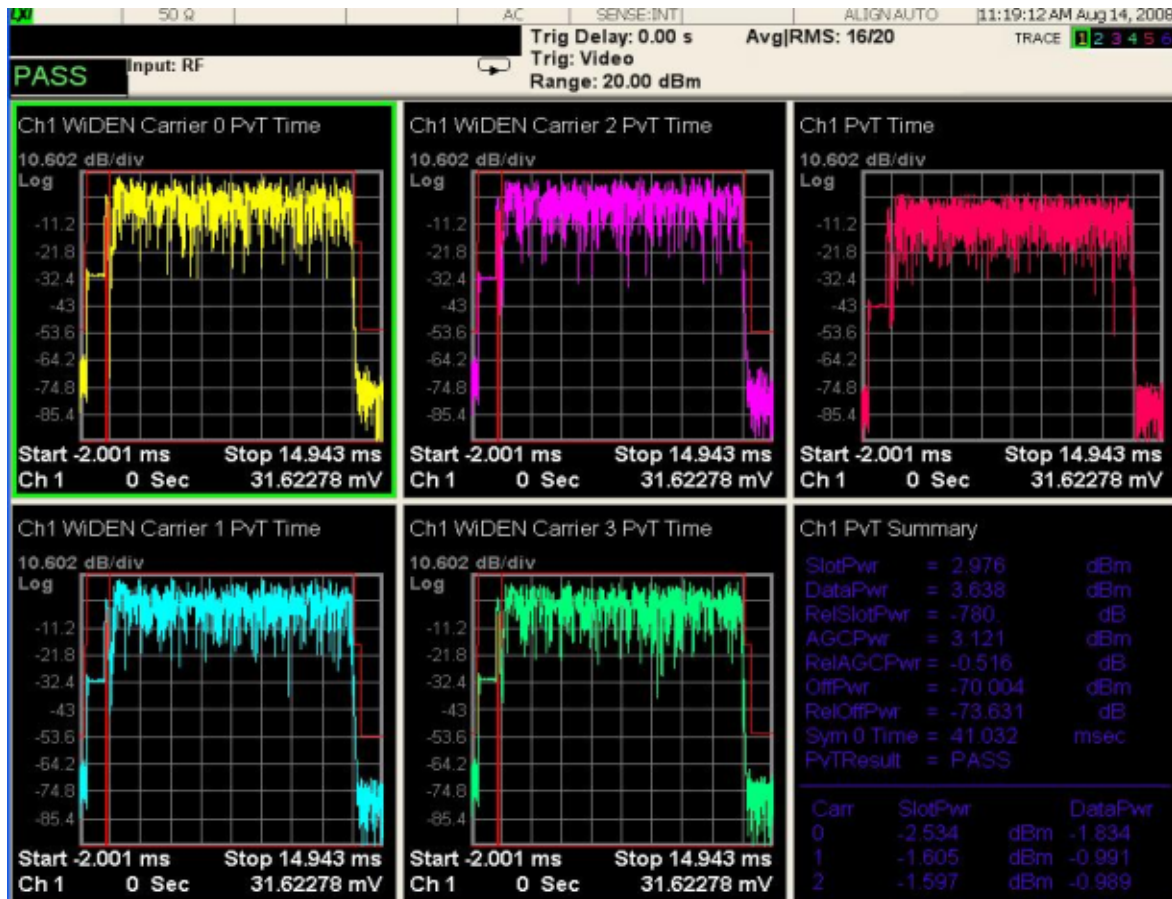


IDEN Demod Measurement
View / Display

View - Preset View: EVM & Symbols The EVM & Symbols view configures a 4 pane layout showing the IQ Meas Time constellation in trace 1, Composite Error Summary in trace 2, the Err Vect Time in trace 3, and the Symbol Table in trace 4.



View - Preset View: WiDEN PvT The WiDEN PvT view configures a 6 pane layout showing the 4 carriers' PvT trace in trace 1 to 4, Composite PvT trace in trace 5, and the PvT summary in trace 6.



This topic contains the following sections:

[“Measurement Commands for MotoTalk Measurement” on page 443](#)

[“Remote Command Results for MotoTalk Measurement” on page 443](#)

Measurement Commands for MotoTalk Measurement

All scalar results for this measurement are contained in one table and there is one equivalent subopcode for the remote results. The remote user can use this equivalence by visually inspecting the corresponding summary trace on the display, or by using CALC:DATA queries, which programmatically describes the corresponding summary trace.

CONFigure:MOTotalk

CONFigure:MOTotalk:NDEFault

FETCh:MOTotalk[n]?

INITiate:MOTotalk

MEASure:MOTotalk[n]?

READ:MOTotalk[n]?

For more measurement related commands, see the SENSE subsystem, and the section [“Remote Measurement Functions” on page 569](#).

Remote Command Results for MotoTalk Measurement

The following table displays the returned results from the (FETCh|MEASure|READ):IDEMod commands, indexed by subopcode:

| Index n | Results Returned |
|-------------------------|---|
| Not specified or n=1 | Returns 36 comma-separated overall scalar results, corresponding exactly to the items returned in the Error Summary: <ol style="list-style-type: none"> 1. Total bursts found 2. Unused 3. Unused 4. Unused 5. Unused 6. Unused |

| Index n | Results Returned |
|-------------------------|---|
| Not specified or n=1 | <p>(Continued)</p> <ol style="list-style-type: none"> 7. EVM (% rms) mean: RMS average for RMS EVM. Unused if average is turned off. 8. EVM (% rms) max: Max for RMS EVM Unused if average is turned off. 9. EVM (% rms) min: Min for RMS EVM Unused if average is turned off. 10. EVM (% rms) StdDev: StdDev for RMS EVM Unused if average is turned off. 11. EVM (% rms) Current: Current value for RMS EVM 12. EVM Peak (% peak) mean : RMS average for Peak EVM. Unused if average is turned off. 13. EVM Peak (% peak) max: Max for Peak EVM. Unused if average is turned off. 14. EVM Peak (% peak) min: Min for Peak EVM. Unused if average is turned off. 15. EVM Peak (% peak) StdDev : StdDev for Peak EVM. Unused if average is turned off. 16. EVM Peak (% peak) Current : Current value for Peak EVM. 17. Carrier Frequency Offset (Hz) mean : RMS average. Unused if average is turned off. 18. Carrier Frequency Offset (Hz) max : Max value. Unused if average is turned off. 19. Carrier Frequency Offset (Hz) min : Min value. Unused if average is turned off. 20. Carrier Frequency Offset (Hz) StdDev: StdDev value. Unused if average is turned off. 21. Carrier Frequency Offset (Hz) Current : Current Value. 22. Freq Dev (Hz) mean : RMS average. Unused if average is turned off. 23. Freq Dev (Hz) max : Max value. Unused if average is turned off. 24. Freq Dev (Hz) min : Min value. Unused if average is turned off. 25. Freq Dev (Hz) StdDev: StdDev value. Unused if average is turned off. 26. Freq Dev (Hz) Current : Current Value. 27. Burst Power (dBm) mean: RMS average. Unused if average is turned off. 28. Burst Power (dBm) max: Max value. Unused if average is turned off. 29. Burst Power (dBm) min: Min value. Unused if average is turned off. |

| Index n | Results Returned |
|-------------------------|--|
| Not specified or n=1 | <p>(Continued)</p> <p>30. Burst Power (dBm) StdDev: StdDev value. Unused if average is turned off.</p> <p>31. Burst Power (dBm) current: Current value.</p> <p>32. Slot Power (dBm) mean: RMS average. Unused if average is turned off.</p> <p>33. Slot Power (dBm) max: Max value. Unused if average is turned off.</p> <p>34. Slot Power (dBm) min: Min value. Unused if average is turned off.</p> <p>35. Slot Power (dBm) StdDev: StdDev value. Unused if average is turned off.</p> <p>36. Slot Power (dBm) current: Current value.</p> |
| n=2 | <p>Returns 37 comma-separated slot scalar results, corresponding exactly to the items returned in the Error Summary:</p> <ol style="list-style-type: none"> 1. Analysis slot: The user's setting in Meas Setup 2. Peak EVM symbol location 3. Unused 4. Unused 5. Unused 6. Unused 7. Unused 8. EVM (% rms) mean: RMS average for RMS EVM. Unused if average is turned off. 9. EVM (% rms) max: Max for RMS EVM Unused if average is turned off. 10. EVM (% rms) min: Min for RMS EVM Unused if average is turned off. 11. EVM (% rms) StdDev: StdDev for RMS EVM Unused if average is turned off. 12. EVM (% rms) Current: Current value for RMS EVM 13. EVM Peak (% peak) mean : RMS average for Peak EVM. Unused if average is turned off. 14. EVM Peak (% peak) max: Max for Peak EVM. Unused if average is turned off. 15. EVM Peak (% peak) min: Min for Peak EVM. Unused if average is turned off. |

| Index n | Results Returned |
|---------|--|
| n=2 | <p>(Continued)</p> <p>16. EVM Peak (% peak) StdDev : StdDev for Peak EVM. Unused if average is turned off.</p> <p>17. EVM Peak (% peak) Current : Current value for Peak EVM.</p> <p>18. Carrier Frequency Offset (Hz) mean : RMS average. Unused if average is turned off.</p> <p>19. Carrier Frequency Offset (Hz) max : Max value. Unused if average is turned off.</p> <p>20. Carrier Frequency Offset (Hz) min : Min value. Unused if average is turned off.</p> <p>21. Carrier Frequency Offset (Hz) StdDev: StdDev value. Unused if average is turned off.</p> <p>22. Carrier Frequency Offset (Hz) Current : Current Value.</p> <p>23. Freq Dev (Hz) mean : RMS average. Unused if average is turned off.</p> <p>24. Freq Dev (Hz) max : Max value. Unused if average is turned off.</p> <p>25. Freq Dev (Hz) min : Min value. Unused if average is turned off.</p> <p>26. Freq Dev (Hz) StdDev: StdDev value. Unused if average is turned off.</p> <p>27. Freq Dev (Hz) Current : Current Value.</p> <p>28. Burst Power (dBm) mean: RMS average. Unused if average is turned off.</p> <p>29. Burst Power (dBm) max: Max value. Unused if average is turned off.</p> <p>30. Burst Power (dBm) min: Min value. Unused if average is turned off.</p> <p>31. Burst Power (dBm) StdDev: StdDev value. Unused if average is turned off.</p> <p>32. Burst Power (dBm) current: Current value.</p> <p>33. Slot Power (dBm) mean: RMS average. Unused if average is turned off.</p> <p>34. Slot Power (dBm) max: Max value. Unused if average is turned off.</p> <p>35. Slot Power (dBm) min: Min value. Unused if average is turned off.</p> <p>36. Slot Power (dBm) StdDev: StdDev value. Unused if average is turned off.</p> <p>37. Slot Power (dBm) current: Current value.</p> |

In addition to these results, other results are defined in Common Functions, Data Queries, MEASure, READ, FETCh in “:CALCulate:DATA” on page 872.

This key selects the MotoTalk EVM and Power measurement.

Key Path: **Meas**
Mode: IDEN
Instrument S/W Revision: A.02.00

AMPTD Y Scale

See “AMPTD Y Scale (Amplitude)” on page 746.

Auto Couple

See “**AUTO COUPLE**” on page 483 in the section "Common Measurement Functions" for more information.

BW

See “BW (Bandwidth)” on page 755.

Cont

See “[Cont \(Continuous Measurement/Sweep\)](#)” on page 503 in the section "Common Measurement Functions" for more information.

Frequency Channel

See “FREQ Channel” on page 759.

Input/Output

See “[Input/Output](#)” on page 507 in the section "Common Measurement Functions" for more information.

Marker

See “Marker” on page 763.

Marker Function

See “Marker Function” on page 782.

Marker To

See “Marker -> (Marker To)” on page 779.

Meas

See “[Meas](#)” on page 569 in the section "Common Measurement Functions" for more information.

Meas Setup

Displays the setup menu for the currently selected measurement.

| | |
|--------------------------|------------------------|
| Key Path: | Front-panel key |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

Test Preset

Test Preset key initializes the measurement to a known state for starting MotoTalk testing. The various Parameters are preset as noted in the Coupling row of each parameter table. This softkey color is green, indicating its status as a preset key.

| | |
|--------------------------|--|
| Key Path: | Meas Setup |
| Mode: | IDEN |
| Remote Command: | CONF:MOTotalk |
| Example: | CONF:MOT |
| Dependencies/Couplings: | This affects other parameters as documented in the Coupling row for each affected parameter. It also performs a Preset View:Test Standard. |
| Instrument S/W Revision: | A.02.00 |

Search Length

The Search Length is the length of the time record acquired to make the measurement. The time must be long enough to include the slot to be analyzed.

If the Trigger is set to Free Run, it must be increased to include the maximum expected latency time.

Search Length is preset to a length appropriate for all slots active. A longer Search Length is needed when the subscriber radio under test is not transmitting in every slot in each frame.

| | |
|-------------------------|--|
| Key Path: | Meas Setup |
| Mode: | IDEN |
| Remote Command: | [:SENSE]:MOTotalk[:SYNC]:SLENgth <time> [:SENSe]:MOTotalk[:SYNC]:SLENgth? |
| Example: | :MOT:SYNC:SLEN .11 |
| Dependencies/Couplings: | Set to 110 ms by Test Preset. |
| Preset: | 110 ms |

MotoTalk Measurement Meas Setup

| | |
|--------------------------|---------|
| Min: | 110 ms |
| Max: | 2 s |
| Instrument S/W Revision: | A.02.00 |

Analysis Slot

Specifies the timeslot for analysis.

| | |
|--------------------------|--|
| Key Path: | Meas Setup |
| Mode: | IDEN |
| Remote Command: | [:SENSe]:MOTotalk:ANALysis:SLOT <integer> [:SENSe]:MOTotalk: ANALysis:SLOT? |
| Example: | :MOT:ANAL:SLOT 0 |
| Preset: | 0 |
| Min: | 0 |
| Max: | 24 |
| Instrument S/W Revision: | A.02.00 |

Avg Number

This softkey sets the number of time records whose measurement results will be averaged. For more information, see [“Avg Number” on page 790](#).

| | |
|--------------------------|-------------------------|
| Key Path: | Meas Setup, More |
| Mode: | IDEN |
| Dependencies/Couplings: | Test Preset sets to 20 |
| Preset: | Off, 20 |
| Instrument S/W Revision: | A.02.00 |

Average Mode

Average Mode determines how the measurement data is processed 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. For more information, see [“Average Mode” on page 791](#).

| | |
|-------------------------|---------------------------------|
| Key Path: | Meas Setup, More |
| Mode: | IDEN |
| Dependencies/Couplings: | Test Preset sets to EXPonential |

Preset: EXPOnential
 Instrument S/W Revision: A.02.00

Average Setup

This softkey accesses a menu for averaging setup parameters. There are no SCPI/features unique to this measurement. For more information, see [“Average Setup” on page 792](#).

Key Path: **Meas Setup, More**
 Mode: IDEN
 Instrument S/W Revision: A.02.00

Average Type

The Average Type key allows you to select the type of averaging. For more information, see [“Average Type” on page 792](#).

Key Path: **Meas Setup, More, Average Setup**
 Mode: IDEN
 Dependencies/Couplings: Test Preset sets to RMS
 Preset: RMS
 Instrument S/W Revision: A.02.00

RMS This softkey selects the RMS Average Type. For more information, see [“Average Type” on page 792](#).

Key Path: **Meas Setup, Average Setup, Average Type**
 Mode: IDEN
 Instrument S/W Revision: A.02.00

Time This softkey selects the Time Average Type. For more information, see [“Average Type” on page 792](#).

Key Path: **Meas Setup, Average Setup, Average Type**
 Mode: IDEN
 Instrument S/W Revision: A.02.00

Max This softkey selects the Max Average Type. For more information, see [“Average Type” on page 792](#).

Key Path: **Meas Setup, Average Setup, Average Type**

MotoTalk Measurement Meas Setup

Mode: IDEN
Instrument S/W Revision: A.02.00

Fast Average

Fast Average controls the display updates of average data. For more information, see “Fast Average” on page 793.

Key Path: **Meas Setup, More, Average Setup**
Mode: IDEN
Dependencies/Couplings: Test Preset sets to OFF
Preset: OFF
Instrument S/W Revision: A.02.00

Update Rate

The Update Rate controls how often the display updates when fast averaging is turned on. For more information, see “Update Rate” on page 793.

Key Path: **Meas Setup, More, Average Setup**
Mode: IDEN
Dependencies/Couplings: Test Preset sets to Manual, 20
Preset: Manual, 20
Instrument S/W Revision: A.02.00

Normalize

Setting this parameter to On will result in the error vector time window to be normalized by the frequency deviation.

Key Path: **Meas Setup, More**
Mode: IDEN
Remote Command: [:SENSe]:MOTotalk:NORMAlize:STATe OFF|ON|0|1
[:SENSe]:MOTotalk:NORMAlize:STATe?
Example: :MOT:NORM:STAT ON
Dependencies/Couplings: Set to On by Test Preset
Preset: On
State Saved: Saved in instrument state.
Range: Off | On

Instrument S/W Revision: A.02.00

Advanced

These parameters are advanced demodulation controls that are not normally used.

Key Path: **Meas Setup, More**

Mode: IDEN

Instrument S/W Revision: A.02.00

Gaussian BT

This softkey sets the demodulation Gaussian receive filter BT (Bandwidth Time product) parameter and is preset per the filter standards. The Gaussian receive filter bandwidth 3 dB bandwidth in Hz is the Symbol Rate divided by the Gaussian BT.

Key Path: **Meas Setup, More, Advanced**

Mode: IDEN

Remote Command: [:SENSe]:MOTotalk:BT <real>
[:SENSe]:MOTotalk:BT?

Example: :MOT:BT 2.5

Dependencies/Couplings: Set to .4 by Test Preset

Preset: 2.5

State Saved: Saved in instrument state.

Min: .05

Max: 100.0

Instrument S/W Revision: A.02.00

Symbol Rate

This softkey sets the Symbol Rate expected by the demodulator and is preset per the standards. This can be used to "tune out" Symbol Rate errors or to accommodate an implementation that runs at less than the standard Symbol Rate.

Key Path: **Meas Setup, More, Advanced**

Mode: IDEN

Remote Command: [:SENSe]:MOTotalk:SRATe <real>
[:SENSe]:MOTotalk:SRATe?

Example: :MOT:SRAT 3200

MotoTalk Measurement Meas Setup

| | |
|--------------------------|--|
| Dependencies/Couplings: | Set to 3200 by Test Preset. Span will be increased, if necessary, to accommodate the signal bandwidth. |
| Preset: | 3200 |
| State Saved: | Saved in instrument state. |
| Min: | 320 |
| Max: | 32000 |
| Instrument S/W Revision: | A.02.00 |

Burst Search

This softkey turns the Burst Search functionality On/Off. The burst search performs a coarse location of the beginning of the burst being analyzed. This is followed by a sync pattern search in the burst over a narrow portion of the detected burst. If Burst Search is turned Off, the sync pattern search will be expanded to include the full range of possible locations within the Search Length. Turning Burst Search off can potentially take much longer than a burst search followed by a limited sync search. Turn Burst Search off only if it appears that signal or interference problems are causing the burst search to fail. Test Preset turns Burst Search On.

| | |
|--------------------------|--|
| Key Path: | Meas Setup, More, Advanced |
| Mode: | IDEN |
| Remote Command: | [:SENSe] :MOTotalk :SYNC :BURSt :STATe OFF ON 0 1 [:SENSe] :MOTotalk :SYNC :BURSt :STATe? |
| Example: | :MOT:SYNC:BURS:STAT ON |
| Dependencies/Couplings: | Set to On by Test Preset |
| Preset: | On |
| State Saved: | Saved in instrument state. |
| Range: | Off On |
| Instrument S/W Revision: | A.02.00 |

Mode

See “Mode” on page 587.

Mode Setup

See “Mode Setup” on page 601.

Peak Search

See “Peak Search” on page 795.

Recall

See “[Recall](#)” on page 611 in the section "Common Measurement Functions" for more information.

Restart

See “Restart” on page [633](#) in the section "Common Measurement Functions" for more information.

Save

See “[Save](#)” on page 635 in the section "Common Measurement Functions" for more information.

Single

See “[Single \(Single Measurement/Sweep\)](#)” on page 661 in the section "Common Measurement Functions" for more information.

Source

See “Source” on page 663.

SPAN X Scale

There are no measurement unique SCPI/features, other than Span being set by other measurement parameters.\

See [“SPAN X Scale” on page 800](#).

| | |
|--------------------------|------------------------|
| Key Path: | Front-panel key |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

Span

This key sets the frequency Span of the measurement. For more information, see [“Span” on page 800](#).

| | |
|--------------------------|---|
| Key Path: | SPAN X Scale |
| Mode: | IDEN |
| Dependencies/Couplings: | Test Preset sets this to 60 kHz. Large changes in Symbol Rate will cause the Span to be increased to accommodate the bandwidth of the signal. |
| Preset: | 60 kHz |
| Instrument S/W Revision: | A.02.00 |

Sweep/Control

See “Sweep / Control” on page 665.

Trace/Detector

This key allows you to select the results shown in the trace windows. There are no remote commands/features unique to this measurement other than the selections under Data.

Key Path: **Front-panel key**
 Mode: IDEN
 Instrument S/W Revision: A.02.00

Data

This accesses a menu of Trace data choices for the selected trace.

Key Path: **Trace/Detector**
 Mode: IDEN
 Instrument S/W Revision: A.02.00

The following are the SCPI string forms for the Data types that are specific to this measurement:

| Trace data soft key name | SCPI string form |
|--------------------------|----------------------|
| Spectrum | "Spectrum1" |
| Inst Spectrum | "Inst Spec1" |
| Search Time | "Search Time1" |
| Time | "Time1" |
| Raw Main Time | "Raw Main Time1" |
| Error Vector Time | "Error Vector Time1" |
| Error Summary | "Error Summary1" |

Pre Demod

This key accesses the Trace Data choices which show pre-demodulation results.

Key Path: **Trace/Detector, Data**
 Mode: IDEN
 Instrument S/W Revision: A.02.00

Spectrum Averaged FFT of the Time waveform.

Key Path: **Trace/Detector, Data, Pre Demod**

MotoTalk Measurement Trace/Detector

Mode: IDEN
Instrument S/W Revision: A.02.00

Inst Spectrum FFT display of the time waveform for the current measurement.

Key Path: **Trace/Detector, Data, Pre Demod**
Mode: IDEN
Instrument S/W Revision: A.02.00

Search Time The Search Length long time record acquired for the current measurement.

Key Path: **Trace/Detector, Data, Pre Demod**
Mode: IDEN
Instrument S/W Revision: A.02.00

Time The input waveform for the current measurement vs. time, over one slot time period.

Key Path: **Trace/Detector, Data, Pre-Demod**
Mode: IDEN
Instrument S/W Revision: A.02.00

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: IDEN
Instrument S/W Revision: A.02.00

Error Vector Time

The overall error vector vs. time, for the measured trace.

Key Path: **Trace/Detector, Data**
Mode: IDEN
Instrument S/W Revision: A.02.00

Slot Error Vector Time

The error vector vs. time of the specific slot defined by "Analysis Slot".

| | |
|--------------------------|-----------------------------|
| Key Path: | Trace/Detector, Data |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

Error Summary

It displays the overall scalar results for all burst found. The following results are shown on the Error Summary table (When average is turned off, the mean, max, min and StdDev values are not available):

- Total Bursts
- EVM (% RMS): Mean, Max, Min, StdDev, Current
- Peak EVM (%): Mean, Max, Min, StdDev, Current
- Carrier Frequency Offset: Mean, Max, Min, StdDev, Current
- Freq Dev: Mean, Max, Min, StdDev, Current
- Burst Power: Mean, Max, Min, StdDev, Current
- Slot Power: Mean, Max, Min, StdDev, Current

| | |
|--------------------------|-----------------------------|
| Key Path: | Trace/Detector, Data |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

Slot Error Summary

It displays the scalar results of the specific slot specified by "Analysis Slot". The following results are shown on the Slot Error Summary table (When average is turned off, the mean, max, min and StdDev values are not available):

- Analysis Slot
- Peak EVM symbol location
- EVM (% RMS): Mean, Max, Min, StdDev, Current
- Peak EVM (%): Mean, Max, Min, StdDev, Current
- Carrier Frequency Offset: Mean, Max, Min, StdDev, Current
- Freq Dev: Mean, Max, Min, StdDev, Current
- Burst Power: Mean, Max, Min, StdDev, Current
- Slot Power: Mean, Max, Min, StdDev, Current

| | |
|-----------|-----------------------------|
| Key Path: | Trace/Detector, Data |
|-----------|-----------------------------|

MotoTalk Measurement
Trace/Detector

Mode: IDEN
Instrument S/W Revision: A.02.00

Trigger

See “Trigger” on page 850.

View/Display

The view setup can be changed by selections from the View/Display menu, or by pressing Test Preset, or by individually selecting traces and layout. The user may change the number of windows in the layout, or the contents of those windows.

Pressing the Preset View softkey will change the layout and view to the Preset View parameters unique to this measurement. This Preset View is an action, not a state.

| | |
|--------------------------|------------------------|
| Key Path: | Front-panel key |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

Display

See [“Display” on page 735](#) in the "Common Measurement Functions" section for more information.

Layout

See [“Layout” on page 865](#).

Preset View: Test Standard

Preset the display layout to pre-defined patterns.

| | |
|--------------------------|---|
| Key Path: | View/Display |
| Mode: | IDEN |
| Remote Command: | :DISPlay:MOTotalk:VIEW:PRESet TSTD SLOT |
| Example: | :DISP:MOT:VIEW:PRES TSTD |
| Notes: | Remote Command Only. TSTD: Test Standard SLOT: Slot |
| Dependencies/Couplings: | This action is performed as part of Test Preset |
| Instrument S/W Revision: | A.02.00 |

Preset View: Slot

Preset the display layout to pre-defined patterns.

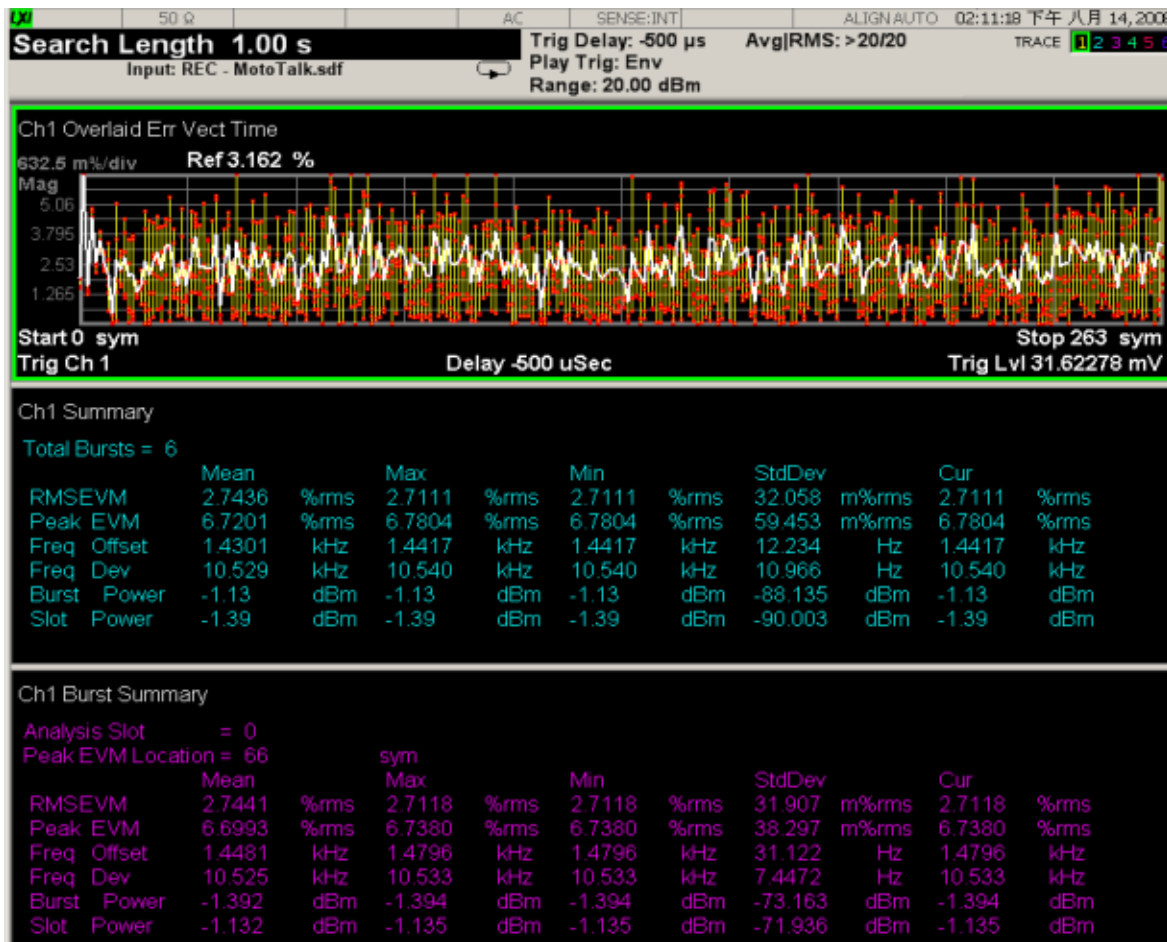
| | |
|-----------|---------------------|
| Key Path: | View/Display |
| Mode: | IDEN |

Example: :DISP:MOT:VIEW:PRES SLOT

Instrument S/W Revision: A.02.00

Measurement Views

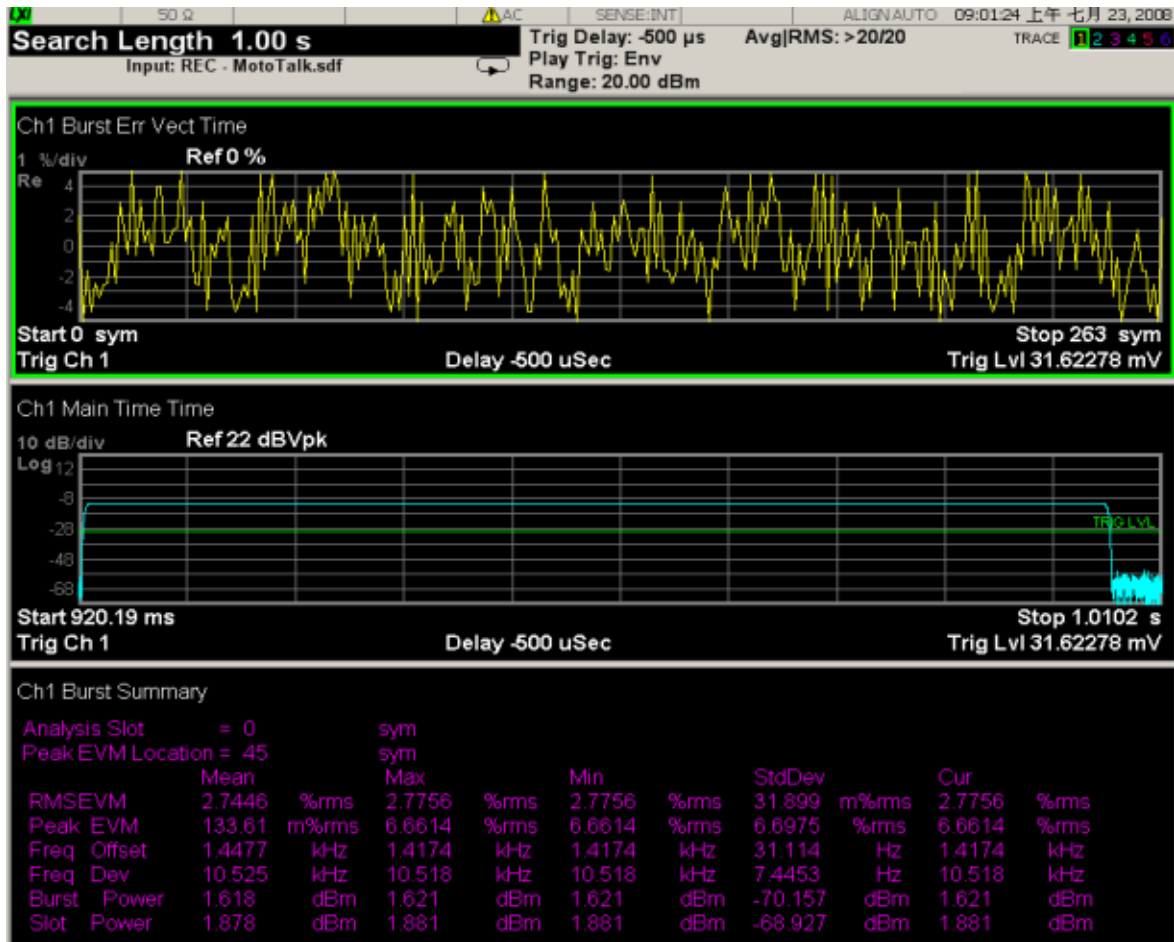
- Preset View: Test Standard



The Test Standard key changes the Layout to "Stack 3" with the following trace assignments and Formats:

1. Error Vector Time Averaged trace for all of the bursts found
2. Error Summary : Averaged summary results for all of the bursts found
3. Slot Error Summary: Summary result for the burst specified by "Analysis Slot"

- Preset View: Slot



The Test Standard key changes the Layout to "Stack 3" with the following trace assignments and Formats:

1. Slot Error Vector Time: Error Vector trace for the specific burst specified by "Analysis Slot"
2. Time: The time trace of the slot specified by "Analysis Slot"
3. Slot Error Summary result for the burst specified by "Analysis Slot"

Front Panel Results

A number of results are available, that include the default displays: the Error Vector vs. Time display, the main Time display, and the scalar results shown in the Error Summary table. Other, more detailed displays are also available.

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 89](#) 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.

Key Path: **Front-panel key**

Instrument S/W Revision: Prior to A.02.00

AUTO COUPLE

Amplitude Y Scale (AMPTD 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 specific to that measurement.

The Amplitude key activates the Amplitude menu and selects Reference Level as the active function.

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

Attenuation

This menu controls both the electrical and mechanical attenuators and their interactions. All parameters in the Attenuation menus are Meas Global, meaning they are common to all the measurements and are unaffected by Meas Preset.

| | |
|-------------------------|---|
| Dependencies/Couplings | In measurements which support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case. |
| Key Path | AMPTD Y Scale |
| Readback Line | Contains a summary in [] brackets of the total attenuation from the menu below, which 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. |
| Instrument S/W Revision | Prior to A.02.00 |

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 Preamplifier 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_ampl> |
| | [:SENSe]:POWer[:RF]:ATTenuation? |
| | [:SENSe]:POWer[:RF]:ATTenuation:AUTO OFF ON 0 1 |
| | [:SENSe]:POWer[:RF]:ATTenuation:AUTO? |

Amplitude Y Scale (AMPTD Y Scale)

| | |
|--------------------------|---|
| Example: | POW:ATT 20 Sets the attenuator to manual mode, and sets the value to 20 dB. |
| 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> $\text{Atten} = \text{ReferenceLevel} + \text{PreAmpGain} + \text{ExternalGain} - \text{RefLevelOffset} - \text{MaxMixerLevel} + \text{IF Gain}.$ <p>Limit this 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> <p>The "IF Gain" term in the equation above is either 0 dB or +10 dB, depending in a fairly complex fashion on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten.</p> |
| Preset: | Auto |
| State Saved: | Saved in State |
| Min: | 0 dB 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. |
| Max: | EXA: 60 dB MXA: 70 dB |
| Key Path: | AMPTD Y Scale, Attenuation |
| Instrument S/W Revision: | Prior to A.02.00 |

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 Y Scale, Attenuation**
 Instrument S/W Revision: Prior to A.02.00

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 knob, 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.
- 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.

Amplitude Y Scale (AMPTD Y Scale)

- 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_amp></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 Y Scale, Attenuation |
| Instrument S/W Revision: | Prior to A.02.00 |

Adjust Atten for Min Clip

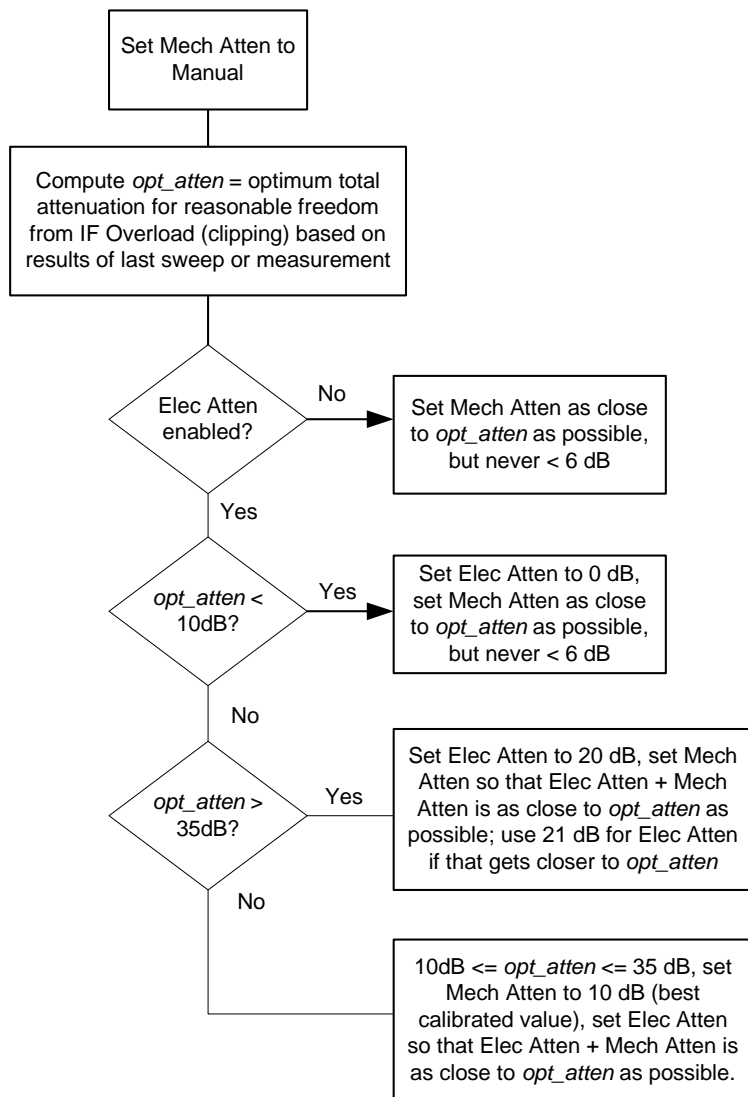
This function is similar to the "Optimize Ref Level" function in some measurements in the Agilent PSA and ESA analyzers. Its purpose is to set the combination of mechanical and electrical attenuation based on the current measured signal level so that clipping will be at a minimum.

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 Y Scale, Attenuation |
| Instrument S/W Revision: | Prior to A.02.00 |

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 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 Y Scale, Attenuation**

Amplitude Y Scale (AMPTD Y Scale)

Instrument S/W Revision: Prior to A.02.00

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: Prior to A.02.00

Off

Example: :POW:RANGe:OPT:ATT OFF

Key Path: **AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip**

Instrument S/W Revision: Prior to A.02.00

Elec Atten Only

Example: :POW:RANGe:OPT:ATT ELEC

Key Path: **AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip**

Instrument S/W Revision: Prior to A.02.00

Mech + Elec Atten

Example: :POW:RANGe:OPT:ATT COMB

Key Path: **AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip**

Instrument S/W Revision: Prior to A.02.00

Mech Atten Step

This controls what step size is used when making adjustments to the Input Attenuation.

Remote Command: [:SENSe]:POWer[:RF]:ATTenuation:STEP[:INCRement] 10 dB |
2 dB
[:SENSe]:POWer[:RF]:ATTenuation:STEP[:INCRement]?

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 Y Scale, Attenuation |
| Instrument S/W Revision: | Prior to A.02.00 |

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: | [:SENSe]:POWER[:RF]:MIXer:RANGe[:UPPer] <real> [:SENSe]:POWER[:RF]:MIXer:RANGe[:UPPer]? |
| Example: | POW:MIX:RANG -15 dBm |
| Preset: | -10 dBm |
| State Saved: | Saved in State |
| Min: | -50 dBm |
| Max: | -10 dBm |
| Key Path: | AMPTD Y Scale, Attenuation |
| Default Unit: | Depends on the current selected Y axis unit, see Swept SA discussion of Y Axis Unit |
| Instrument S/W Revision: | Prior to A.02.00 |

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

Amplitude Y Scale (AMPTD Y Scale)

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 |

| | |
|-------------------------|--|
| Restriction and Notes | Visible only when the selected input is I/Q. |
| Key Path | AMPTD Y Scale |
| State Saved | No |
| Readback Text | When Range is Auto, "[Auto]" When Range is Man and I & Q are the same, "[<range value>]" When Range is Man and I & Q are different: "[I: <I range value> Q: <Q range value>]" See I Range and Q Range for the <range value> enumeration definition. |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|------------------------|---|
| Remote Command | [:SENSe] :VOLTage :IQ :RANGe :AUTO OFF ON 0 1 [:SENSe] :VOLTage :IQ :RANGe :AUTO? |
| Dependencies/Couplings | When in Auto, both I Range and Q Range are set to the same value, computed as follows: 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: YMax = max(abs(top), abs(bottom)). The I Range and Q Range are then set to YMax. If Auto is not supported, sending the SCPI command will generate an error. |

| | |
|-------------------------|---|
| Example | Put the I Range and Q Range in manual. VOLT:IQ:RANG:AUTO OFF |
| Key Path | AMPTD Y Scale, Range |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | Auto Man |
| Instrument S/W Revision | Prior to A.02.00 |

This is an alternate form of the SCPI command to match the POWER form of the I Range and Q Range SCPI.

| | |
|--------------------------|--|
| Remote Command: | [:SENSE] :POWER : IQ :RANGE :AUTO OFF ON 0 1 [:SENSE] :POWER : IQ :RANGE :AUTO ? |
| 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: | Put the I Range and Q Range in manual. POW:IQ:RANG:AUTO OFF |
| Instrument S/W Revision: | Prior to A.02.00 |

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 496.

| | |
|------------------------|--|
| Remote Command | [:SENSE] :VOLTage : IQ [: I] :RANGE [:UPPER] <voltage> [:SENSE] :VOLTage : IQ [: I] :RANGE [:UPPER] ? |
| 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 |
| Key Path | AMPTD Y Scale, Range |

Amplitude Y Scale (AMPTD Y Scale)

| | |
|-------------------------|--|
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |

This is an alternate form of the SCPI command to allow entry as a power.

Remote Command: `[:SENSe] :POWer :IQ [: I] :RANGe [:UPPer] <amp;gt;`
`[:SENSe] :POWer :IQ [: I] :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 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: Prior to A.02.00

Q Range

Bring up the Q Range menu.

| | |
|-------------------------|---|
| Key Path | AMPTD Y Scale, Range |
| Readback Text | Q Same as I 1 V Peak 0.5 V Peak 0.25 V Peak 0.125 V Peak When Q Same as I is On, the readback is "Q Same as I", otherwise it is the Q Range value. |
| Instrument S/W Revision | Prior to A.02.00 |

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 need 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.

| | |
|-------------------------|---|
| Remote Command | [:SENSe] :VOLTage POWer :IQ :MIRRored OFF ON 0 1 [:SENSe] :VOLTage POWer :IQ :MIRRored ? |
| 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 |
| Key Path | AMPTD Y Scale, Range, Q Range |
| Preset | On |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Readback Text | "Q Same as I" when On, otherwise none. |
| Instrument S/W Revision | Prior to A.02.00 |

Q Range Value This is the internal gain range for the Q channel. See [“I/Q Gain Ranges” on page 496](#). 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.

| | |
|-------------------------|--|
| Remote Command | [:SENSe] :VOLTage : IQ : Q : RANGE [:UPPer] <voltage> [:SENSe] :VOLTage : IQ : Q : RANGE [:UPPer] ? |
| 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. |
| Example | Set the Q Range to 0.5 V Peak VOLT:IQ:Q:RANG 0.5 V |
| Key Path | AMPTD Y Scale, Range |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |

Amplitude Y Scale (AMPTD Y Scale)

This is an alternate form of the SCPI command to allow entry as a power.

| | |
|--------------------------|--|
| Remote Command: | <code>[:SENSE] :POWER :IQ :Q :RANGE [:UPPER] <ampl></code> <code>[:SENSE] :POWER :IQ :Q :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 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 (1 V Peak, 0.5 V Peak, 0.25 V Peak, and 0.125 V 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: | Prior to A.02.00 |

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 | Prior to A.02.00 |

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 | Prior to A.02.00 |

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 | Prior to A.02.00 |

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 | Prior to A.02.00 |

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.

The value displayed on the **Presel Adjust** key will change to reflect the new preselector tuning (see **Presel Adjust**, below).

A number of considerations should be observed to ensure proper operation:

If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.

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, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated

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 analyzer 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 |

Amplitude Y Scale (AMPTD 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 0.5001 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 Y Scale

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: Prior to A.02.00

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 Y Scale |
| Default Unit: | Hz |
| Instrument S/W Revision: | Prior to A.02.00 |
| 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: MWAVE = 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> |

Amplitude Y Scale (AMPTD Y Scale)

Instrument S/W Revision: Prior to A.02.00

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 Y Scale**

Instrument S/W Revision: Prior to A.02.00

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 Y Scale, Internal Preamp**

Instrument S/W Revision: Prior to A.02.00

Off

Turns the internal preamp off

Example: :POW:GAIN OFF

Key Path: **AMPTD Y Scale, Internal Preamp**
 Readback: Off
 Instrument S/W Revision: Prior to A.02.00

Low Band

Sets the internal preamp to use only the low band (0–3.6 GHz)

Example: :POW:GAIN ON
 :POW:GAIN:BAND LOW

Key Path: **AMPTD Y Scale, Internal Preamp**
 Readback: Low Band
 Instrument S/W Revision: Prior to A.02.00

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 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 Y Scale, Internal Preamp**
 Readback: Full Range
 Instrument S/W Revision: Prior to A.02.00

Amplitude Y Scale (AMPTD Y Scale)

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: | Prior to A.02.00 |

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc. when in Continuous mode. When the average count reaches the **Average/Hold Number** the count stops incrementing but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the **Average/Hold Number** is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of **Trace Average, Max Hold, or Min Hold**.

In Other Measurements/Modes:

With **Avg 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.

Frequency Channel (FREQ Channel)

The Frequency key opens up a menu of keys that allow you to control the Frequency parameters of the instrument.

See “FREQ Channel” on page 759 for more information.

NOTE In iDEN Demod, iDEN Power, Vector Analysis and Monitor Spectrum measurements, when user changes the slot format and carrier configuration, the center frequency will be coupled and changed.

| iDEN Slot Format | WiDEN Slot Format 25kHz | WiDEN Slot Format 50kHz | WiDEN Slot Format 75kHz | WiDEN Slot Format 100kHz | WiDEN Slot Format 50kHz Out |
|------------------|-------------------------|-------------------------|-------------------------|--------------------------|-----------------------------|
| 806MHz | 806MHz | 806.0125MHz | 806.025MHz | 806.0375MHz | 806.0375MHz |

Key Path **Front-panel key**
 Instrument S/W Revision A.02.00

Frequency Channel (FREQ Channel)

Input/Output

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

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

Other functions related to the input/output connections, but which tend to change on a measurement by measurement basis, can be found under **Trig** and **Amplitude**. In addition, some of the digital I/O bus configurations can be found under **System**.

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

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

| | |
|--------------------------|--|
| Remote Command: | [:SENSe] :FEED RF AIQ IQ IONLY QONLY 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 |
| Key Path: | Front-panel key |
| Instrument S/W Revision: | Prior to A.02.00 |

Input/Output variables - Preset behavior

Virtually all the input/output settings are NOT a part of mode preset. They can be set to their default value by one of the three ways - by using the Restore Input/Output Defaults key on the first page of the input/output menu, by using the System->Restore System Defaults->Input/Output Settings or by using the System -> Restore System Defaults->All. Also, they survive 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

Input/Output

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 |
| Readback: | The current input impedance settings are Readback to this key i.e. "XX, ZZ" where XX is AC or DC and ZZ is 50 or 75 |
| Instrument S/W Revision: | Prior to A.02.00 |

Input Z Correction

Sets the input impedance for unit conversions. This affects the results when the y axis unit is voltage or current units (dBmV, 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 Input |
| Readback: | 50 or 75. Current setting reads back to the RF key. |
| Instrument S/W Revision: | Prior to A.02.00 |

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 Input**

Instrument S/W Revision: Prior to A.02.00

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 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.

Input/Output

| | |
|-------------------------|--|
| Remote Command Notes | 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. [:SENSe]:FEED IQ IONLy QONLy [:SENSe]:FEED? [:SENSe]:FEED IQ will set the I/Q path to IQ [:SENSe]:FEED IONLy will set the I/Q path to I Only [:SENSe]:FEED QONLy will set the I/Q path to QOnly Note [:SENSe]:FEED? will not be backward compatible. The query [:SENSe]:FEED? will always return AIQ whatever the type of legacy parameters IQ IONLy QONLy has been used. |
| Example | FEED AIQ |
| Key Path | Input/Output |
| Mode | BASIC, CDMA2K, EDGE GSM, TDSCDMA, VSA89601, WIMAX OFDMA |
| Instrument S/W Revision | Prior to A.02.00 |

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

Input/Output

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 N9020A 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. With option S40, the available bandwidth becomes 40 MHz, giving 40 MHz each to I and Q, that is 80 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.

| | |
|-------------------------|---|
| Remote Command | <code>[:SENSe] :FEED:IQ:TYPE IQ IONLY QONLY</code> <code>[:SENSe] :FEED:IQ:TYPE?</code> |
| Example | Set the input to be both the I and Q channels, combined as $I + j * Q$. <code>FEED:IQ:TYPE IQ</code> |
| Key Path | Input/Output, I/Q |
| 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 |
| Readback Text | I+jQ I Only Q Only |
| Instrument S/W Revision | Prior to A.02.00 |

Remote Command: :INPut[1]:IQ:TYPE IQ|I|Q
 :INPut[1]:IQ:TYPE?
 Preset: IQ
 Instrument S/W Revision: Prior to A.02.00

I+jQ Set the signal input to be both the I and Q channels. The I and Q channel data will be combined as $I + j * Q$.

Example Set the input to be both the I and Q channels, combined as $I + j * Q$.
 FEED:IQ:TYPE IQ
 Key Path **Input/Output, I/Q, I/Q Path**
 Instrument S/W Revision Prior to A.02.00

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.

Example Set the input to be only the I channel.
 FEED:IQ:TYPE IONL
 Key Path **Input/Output, I/Q, I/Q Path**
 Instrument S/W Revision Prior to A.02.00

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.

Example Set the input to be only the Q channel.
 FEED:IQ:TYPE QONL
 Key Path **Input/Output, I/Q, I/Q Path**
 Instrument S/W Revision Prior to A.02.00

I Setup

Access the channel setup parameters for the I channel.

Key Path **Input/Output, I/Q**
 Instrument S/W Revision Prior to A.02.00

I Differential Input Select differential input on or off for the I channel. For differential input (also

Input/Output

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.

| | |
|--------------------------|---|
| Remote Command | <code>:INPut:IQ[:I]:DIFFerential OFF ON 0 1</code> <code>:INPut:IQ[:I]:DIFFerential?</code> |
| 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 <code>INP:IQ:DIFF ON</code> |
| Key Path | Input/Output, I/Q, I Setup |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Remote Command: | <code>:INPut [1] : IQ : BALanced [: STATE] OFF ON 0 1</code> <code>:INPut [1] : IQ : BALanced [: STATE] ?</code> |
| 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: | Prior to A.02.00 |

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? |
| 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 |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|--|
| Remote Command | [:SENSE]:CORRection:IQ[:I]:SKEW <seconds> [:SENSE]:CORRection:IQ[:I]:SKEW? |
| Example | Delay the data for the I channel by 10 ns. CORR:IQ:SKEW 10 ns |
| Key Path | Input/Output, I/Q, I Setup |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |

I Probe Access the probe setup parameters for the I channel. See [“I/Q Probe Setup” on page 519](#).

| | |
|----------|-----------------------------------|
| Key Path | Input/Output, I/Q, I Setup |
|----------|-----------------------------------|

Input/Output

| | |
|-------------------------|--|
| State Saved | No |
| Readback Text | [<I port probe id> This is reporting the type of probe sensed on the I port. There is no parameter for overriding what is sensed. |
| Instrument S/W Revision | Prior to A.02.00 |

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 = 50Ω
B50: Differential Input = On, Input Z = 50Ω
U1M: Differential Input = Off, Input Z = 1 MΩ
B1M: Differential Input = On, Input Z = 1 MΩ

This command is for backwards compatibility. It combines the Input Z (50Ω or 1 MΩ) 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: Prior to A.02.00

Q Setup

Access the channel setup parameters for the Q channel.

| | |
|-------------------------|---|
| Key Path | Input/Output, I/Q |
| Readback Text | When Q Same as I is On the readback is "Q Same as I". |
| Instrument S/W Revision | Prior to A.02.00 |

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 parameters to be mirrored from the I channel. That way you only need 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.

| | |
|-------------------------|---|
| Remote Command | :INPut:IQ:MIRROred OFF ON 0 1 :INPut:IQ:MIRROred? |
| 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 |
| Key Path | Input/Output, I/Q, Q Setup |
| 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 |
| Readback Text | "Q Same as I" when On, otherwise none. |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-----------------------|--|
| Remote Command | :INPut:IQ:Q:DIFFerential OFF ON 0 1 :INPut:IQ:Q:DIFFerential? |
|-----------------------|--|

Input/Output

| | |
|-------------------------|---|
| 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> |
| Key Path | Input/Output, I/Q, Q Setup |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |

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 | <pre>:INPut [1] : IQ : Q : IMPedance LOW HIGH :INPut [1] : IQ : Q : IMPedance?</pre> |
| 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 MΩ |
| Example | <p>Set the Q channel input impedance to 1 MΩ</p> <p>INP:IQ:Q:IMP HIGH</p> |
| 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" |
| Range | 50 Ω 1 M Ω |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|---|
| Remote Command | [:SENSe]:CORRection:IQ:Q:SKEW <seconds> [:SENSe]:CORRection:IQ:Q:SKEW? |
| Example | Delay the data for the Q channel by 10 ns. CORR:IQ:Q:SKEW 10 ns |
| Key Path | Input/Output, I/Q, Q Setup |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |

Q Probe Access the probe setup parameters for the Q channel. See [“I/Q Probe Setup” on page 519](#).

| | |
|-------------------------|---|
| Key Path | Input/Output, I/Q, Q Setup |
| State Saved | No |
| Readback Text | [<Q port probe id>] This is reporting the type of probe sensed on the Q port. There is no parameter for overriding what is sensed. |
| Instrument S/W Revision | Prior to A.02.00 |

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".

Input/Output

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 551](#)).

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 are 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.

| | |
|-------------------------|--|
| Remote Command | <code>[:SENSE]:CORREction:IQ:I Q:ATTenuation:RATio <real></code> <code>[:SENSE]:CORREction:IQ:I Q:ATTenuation:RATio?</code> |
| 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> |
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |

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_amp></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: Prior to A.02.00

Offset Some active probes have DC offset capability. When one of these probes is connected 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.

| | |
|-------------------------|--|
| Remote Command | :INPut:OFFSet:I Q <voltage> :INPut:OFFSet:I Q? |
| 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:OFFS:I -0.5 |
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-----------------------|--|
| Remote Command | :INPut:COUPling:I Q DC LFR1 LFR2 :INPut:COUPling:I Q? |
| 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 |
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe |
| Preset | DC |
| State Saved | Saved with probe calibration data. It survives power cycle and is not affected by Preset or Restore. |

Input/Output

| | |
|-------------------------|---------------------------------------|
| Range | DC AC 1.7 Hz LFR1 AC 0.14 Hz LFR2 |
| Readback Text | DC LFR1 LFR2 |
| Instrument S/W Revision | Prior to A.02.00 |

DC Turn off low frequency rejection, allowing signals down to DC.

| | |
|-------------------------|--|
| Example | Turn off low frequency rejection on the I channel INP:COUP:I DC |
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling |
| Instrument S/W Revision | Prior to A.02.00 |

LFR1 Turn on low frequency rejection, rejecting signal component lower than 1.7 Hz.

| | |
|-------------------------|---|
| Example | Turn on low frequency rejection on the I channel for frequencies lower than 1.7 Hz INP:COUP:I LFR1 |
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling |
| Instrument S/W Revision | Prior to A.02.00 |

LFR2 Turn on low frequency rejection, rejecting signal component lower than 0.14 Hz.

| | |
|-------------------------|--|
| Example | Turn on low frequency rejection on the I channel for frequencies lower than 0.14 Hz INP:COUP:I LFR2 |
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling |
| Instrument S/W Revision | Prior to A.02.00 |

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 551](#).

| | |
|----------|--|
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling |
|----------|--|

| | |
|-------------------------|---|
| Readback Text | The last calibration date, or if no calibration exists, "(empty)". Last: <cal date> <cal time> Example: Last: 8/22/2007 1:02:49 PM |
| Instrument S/W Revision | Prior to A.02.00 |

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 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.

| | |
|-------------------------|---|
| 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 |
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe |
| Instrument S/W Revision | Prior to A.02.00 |

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 514](#)).

| | |
|-----------------------|--|
| Remote Command | :INPut:IMPedance:REFErence <integer> :INPut:IMPedance:REFErence? |
| Example | Set the I/Q reference impedance to 50 Ω INP:IMP:REF 50 |
| Key Path | Input/Output, I/Q |
| 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 |

Input/Output

Instrument S/W Revision Prior to A.02.00

RF Calibrator

Lets you choose a calibrator signal to look at or turns the calibrator "off" (meaning switches back to the selected input). When one of the calibrator signals is selected, the analyzer routes that signal (an internal amplitude reference) to the analyzer, while leaving the main input selection menu (RF or I/Q) unchanged.

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.

The 4.8 GHz internal reference is only available in some models, and only with options 507, 508, 513, and 526.

Preset: OFF

State Saved: Saved in State

Key Path: **Input/Output**

Readback: Off, 50 MHz, 4.8 GHz or Comb

Instrument S/W Revision: Prior to A.02.00

50 MHz

Key Path **Input/Output, RF Calibrator**

Readback 50 MHz

Instrument S/W Revision Prior to A.02.00

4.8 GHz

Selects the 4.8 GHz internal reference as the input signal.

| | |
|--------------------------|--|
| Dependencies/Couplings: | This key is blank (unavailable) in MXA with frequency option 503, and in EXA |
| Key Path: | Input/Output, RF Calibrator |
| Readback: | 4.8 GHz |
| Instrument S/W Revision: | Prior to A.02.00 |

Comb

| | |
|-------------------------|------------------------------------|
| Key Path | Input/Output, RF Calibrator |
| Readback | Comb |
| Instrument S/W Revision | Prior to A.02.00 |

Off

Switches the input back to the selected input (RF, Ext Mix or I/Q)

| | |
|-------------------------|------------------------------------|
| Key Path | Input/Output, RF Calibrator |
| Readback | Off |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------|---|
| NOTE | 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. |
|-------------|---|

Input/Output

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.

Key Path: **Input/Output**

Readback: 1-of-N selection | [variable]

Instrument S/W Revision: Prior to A.02.00

Ext Preamp

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

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: [:SENSe]:CORRection:SA[:RF]:GAIN <rel_amp>

[:SENSe]:CORRection:SA[:RF]:GAIN?

Example: CORR:SA:GAIN 10 sets the Ext Gain value to 10 dB

CORR:SA:GAIN -10 sets the Ext Gain value to -10 dB (that is, an attenuation of 10 dB)

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, External Gain |
| Readback: | Preamp Gain, <Ext Gain value> dB |
| Instrument S/W Revision: | Prior to A.02.00 |

MS

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

| | |
|--------------------------|---|
| Remote Command: | [:SENSe] :CORRection:MS[:RF] :GAIN <rel_ampl> [:SENSe] :CORRection:MS[:RF] :GAIN? |
| Example: | CORR:MS:GAIN 10 sets the Ext Gain value to 10 dB CORR:MS:GAIN -10 sets the Ext Gain value to -10 dB (that is, a loss of 10 dB.) |
| 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: | -100 dB |
| Max: | 100 dB |
| Key Path: | Input/Output, External Gain |
| Readback: | MS, <Ext Gain value> dB |
| Instrument S/W Revision: | Prior to A.02.00 |

BTS

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

| | |
|-------------------------|---|
| Remote Command: | [:SENSe] :CORRection:BTS[:RF] :GAIN <rel_ampl> [:SENSe] :CORRection:BTS[:RF] :GAIN? |
| Example: | CORR:BTS:GAIN 10 sets the Ext Gain value to 10 dB CORR:BTS:GAIN -10 sets the Ext Gain value to -10 dB (that is, a loss of 10 dB.) |
| 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: | -100 dB |
| Max: | 100 dB |
| Key Path: | Input/Output, External Gain |
| Readback: | BTS, <Ext Gain value> dB |
| Instrument S/W Revision: | Prior to A.02.00 |

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.

| | |
|-------------------------|--|
| Remote Command | <code>[:SENSE]:CORRection:IQ:I:GAIN <rel_ampl></code> <code>[:SENSE]:CORRection:IQ:I:GAIN?</code> |
| Restriction and Notes | Not available unless option BBA is installed |
| Example | Set the I Ext Gain to 10 dB <code>CORR:IQ:I:GAIN 10</code> Set the I Ext Gain to -10 dB (that is, a loss of 10 dB.) <code>CORR:IQ:I:GAIN -10</code> |
| Key Path | Input/Output, External 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 |
| Readback Text | I Gain, <I Ext Gain> dB |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|--|
| Remote Command | <code>[:SENSe]:CORRection:IQ:Q:GAIN <rel_amp1></code> <code>[:SENSe]:CORRection:IQ:Q:GAIN?</code> |
| Restriction and Notes | Not available unless option BBA is installed |
| Example | Set the Q Ext Gain to 10 dB <code>CORR:IQ:Q:GAIN 10</code> Set the Q Ext Gain to -10 dB (that is, a loss of 10 dB.) <code>CORR:IQ:Q:GAIN -10</code> |
| Key Path | Input/Output, External 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 |
| Readback Text | Q Gain, <I Ext Gain> dB |
| Instrument S/W Revision | Prior to A.02.00 |

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 other system settings or mode settings and does not cause a mode switch. All the features described in this section are reset using this key, including Input Corrections and Data (described in the Corrections section).

| | |
|--------------------------|--|
| Example: | <code>:SYST:DEF INP</code> 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 <code>:SYSTem:DEFault INPut:</code> command. |
| Key Path: | Input/Output |
| Instrument S/W Revision: | Prior to A.02.00 |

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

Input/Output

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
RECorded = 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**

Readback: Variable

Instrument S/W Revision: Prior to A.02.00

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**

Readback: Inputs

Instrument S/W Revision: Prior to A.02.00

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**

Readback: Stored Data

Instrument S/W Revision: Prior to A.02.00

Recorded Data

Directs the instrument to get data from the record data buffer in the measurement, rather 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**

Readback: Recorded Data

Instrument S/W Revision: Prior to A.02.00

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

Input/Output

| | |
|--------------------------|---|
| 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: | Prior to A.02.00 |

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. |
| Key Path | Input/Output, Data Source |
| Mode | VSA |
| Instrument S/W Revision | Prior to A.02.00 |

| | |
|--------------------------|---|
| 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: | Prior to A.02.00 |

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.

Key Path **Input/Output, Data Source**
 Mode VSA
 Preset 50 Records, Manual
 State Saved No
 Min 0
 Max Depends on memory available
 Readback <value><Seconds|Points|Records>
 Instrument S/W Revision Prior to A.02.00

Remote Command [:SENSE]:RECORDing:LENGth:VALue?

Example REC:LENG:VAL?

Remote Command Notes Query Only
 Returns the first (numeric) parameter of the most recent [:SENSE]:RECORDing:LENGth command.

Mode VSA
 Preset 50 Records
 Instrument S/W Revision Prior to A.02.00

Remote Command [:SENSE]:RECORDing:LENGth:UNIT?

Example REC:LENG:UNIT?

Input/Output

| | |
|-------------------------|---|
| Remote Command Notes | Query Only Returns the second parameter of the most recent [:SENSe]:RECORDing:LENGth command. Possible values are SEC REC POIN. If no second parameter was sent, then the return value is SEC. |
| Mode | VSA |
| Preset | RECORDs |
| Instrument S/W Revision | Prior to A.02.00 |

Corrections

This key accesses the Amplitude Corrections menu.

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

Trace data is in absolute units and corrections data is in relative units, but we want to be able to display trace data at the same time as corrections data. Therefore we establish a reference line to be used while building or editing a Corrections table. The reference line is halfway up the display and represents 0 dB of correction. It is labeled "0 dB CORREC". It is drawn in blue (0,0,255) and is three pixels high.

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

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

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

| Key Path | Input/Output, Corrections |
|-------------------------|---|
| Mode | SA, DVB-T/H, DTMB |
| Measurement | Swept SA |
| Preset | Corrections arrays are reset (deleted) by Restore Input/Output Defaults. They survive shutdown and restarting of the analyzer application, which means they will survive a power cycle. |
| Dependencies/Couplings | Amplitude correction may not be available in all modes; if a mode does not support amplitude correction, the Corrections key should be blanked while in that mode. If an application supports corrections but the current measurement does not, then the key should be grayed out in that measurement |
| Instrument S/W Revision | A.02.00 |

Select Correction

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

| | |
|-------------------------|--|
| Key Path | Input/Output, Corrections |
| Mode | SA |
| Preset | Set to Correction 1 by Restore Input/Output Defaults |
| Readback | Correction 1 Correction 2 Correction 3 Correction 4 |
| Instrument S/W Revision | A.02.00 |

Correction On/Off

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

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

| | |
|--------------------------|---|
| Remote Command: | [:SENSe] :CORRection :CSET [1] 2 3 4 [:STATe] ON OFF 1 0 [:SENSe] :CORRection :CSET [1] 2 3 4 [:STATe] ? |
| Example: | SENS:CORR:CSET1 ON |
| Dependencies/Couplings: | Turning this on automatically turns on "Apply Corrections" Only the first correction array (Correction 1) supports antenna units. When this array is turned on, and it contains an Antenna Unit other than "None", the Y Axis Unit of the analyzer is forced to that Antenna Unit. All other Y Axis Unit choices are grayed out. Note that this means that a correction file with an Antenna Unit can only be loaded into the Corrections 1 register. Consequently only for Correction 1 does the dropdown in the Recall dialog include .ant, and if an attempt is made to load a correction file into any other Correction register which DOES contain an antenna unit, a Mass Storage error is generated. |
| Preset: | Not affected by Preset. Set to OFF by Restore Input/Output Defaults |
| State Saved: | Saved in State |
| Key Path: | Input/Output, Corrections |
| Instrument S/W Revision: | A.02.00 |

Input/Output

Properties

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

| | |
|-------------------------|----------------------------------|
| Key Path | Input/Output, Corrections |
| Instrument S/W Revision | A.02.00 |

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

| | |
|-------------------------|--|
| Key Path | Input/Output, Corrections, Properties |
| Preset | Set to Correction 1 by Restore Input/Output Defaults |
| Readback | Correction 1 Correction 2 Correction 3 Correction 4 |
| Instrument S/W Revision | A.02.00 |

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

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

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

| | |
|-----------------------|--|
| Remote Command | <code>[:SENSe]:CORRection:CSET[1] 2 3 4:ANTenna[:UNIT] GAUSS PTESla UVM UAM NOConversion [:SENSe]:CORRection:CSET[1] 2 3 4:ANTenna[:UNIT]?</code> |
|-----------------------|--|

| | |
|---------|--------------------|
| Example | CORR:CSET:ANT GAUS |
|---------|--------------------|

| | |
|------------------------|---|
| Dependencies/Couplings | Only the first correction array (Correction 1) supports antenna units. Note that this means that a correction file with an Antenna Unit can only be loaded into the Corrections 1 register. Consequently only for Correction 1 does the dropdown in the Recall dialog include.ant, and if an attempt is made to load a correction file into any other Correction register which DOES contain an antenna unit, a Mass Storage error is generated. |
|------------------------|---|

| | |
|----------|---|
| Key Path | Input/Output, Corrections, Properties |
| Mode | SA |
| Preset | Unaffected by Preset. Set to NOC by Restore Input/Output Defaults |

State Saved Saved in State

Instrument S/W Revision A.02.00

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

Example: :CORR:CSET2:ANT UVM

Key Path: **Input/Output, Corrections, Properties, Antenna Unit**

Readback: "dB μ V/m"

Instrument S/W Revision: A.02.00

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

Example: :CORR:CSET2:ANT UVA

Key Path: **Input/Output, Corrections, Properties, Antenna Unit**

Readback: " dB μ A/m"

Instrument S/W Revision: A.02.00

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

Example: :CORR:CSET3:ANT PTES

Key Path: **Input/Output, Corrections, Properties, Antenna Unit**

Readback: "dBpT"

Instrument S/W Revision: A.02.00

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

Example: :CORR:CSET:ANT GAUS

Key Path: **Input/Output, Corrections, Properties, Antenna Unit**

Readback: " dBG"

Instrument S/W Revision: A.02.00

Input/Output

None Selects no antenna unit for this Correction set. Thus no Y Axis unit will be forced.

Example: :CORR:CSET4:ANT NOC
Key Path: **Input/Output, Corrections, Properties, Antenna Unit**
Readback: "None"
Instrument S/W Revision: A.02.00

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

This setting is handled and stored individually per correction set.

Remote Command: [:SENSe]:CORRection:CSET[1]|2|3|4:X:SPACing
LINear|LOGarithmic
[:SENSe]:CORRection:CSET[1]|2|3|4:X:SPACing?
Example: CORR:CSET:X:SPAC LIN
Preset: Unaffected by Preset. Set to Linear by Restore Input/Output Defaults
State Saved: Saved in State
Key Path: **Input/Output, Corrections, Properties**
Instrument S/W Revision: A.02.00

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

Remote Command: [:SENSe]:CORRection:CSET[1]|2|3|4:DESCription "text"
[:SENSe]:CORRection:CSET[1]|2|3|4:DESCription?
Example: :CORR:CSET1:DESC "11941A Antenna correction"
Remote Command Notes: 45 chars max; may not fit on display if max chars used
Preset: Unaffected by Preset. Set to empty by **Restore Input/Output Defaults**
State Saved: Saved in State
Key Path: **Input/Output, Corrections, Properties**
Instrument S/W Revision: A.02.00

Comment Sets an ASCII comment field which will be stored in an exported file. Can be displayed in

the active function area by selecting as the active function, if desired to be in a screen dump.

| | |
|--------------------------|--|
| Remote Command: | [:SENSE] :CORRection:CSET[1] 2 3 4 :COMMeNt "text" [:SENSE] :CORRection:CSET[1] 2 3 4 :COMMeNt? |
| Example: | :CORR:CSET1:COMM "this is a comment" |
| Remote Command Notes: | 45 chars max; may not fit on display if max chars used |
| Preset: | Unaffected by Preset. Set to empty by Restore Input/Output Defaults |
| State Saved: | Saved in State |
| Key Path: | Input/Output, Corrections, Properties |
| Instrument S/W Revision: | A.02.00 |

Edit

Invokes the integrated editing facility for this correction set.

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

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

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

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

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

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

Input/Output

its previous setting.

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

| | |
|-------------------------|----------------------------------|
| Key Path | Input/Output, Corrections |
| Instrument S/W Revision | A.02.00 |

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

| | |
|-------------------------|--|
| Key Path | Input/Output, Corrections, Edit |
| Notes | There is no value readback on the key |
| Instrument S/W Revision | A.02.00 |

Frequency Lets you edit the frequency of the current row.

| | |
|-------------------------|--|
| Key Path | Input/Output, Corrections, Edit |
| Notes | There is no value readback on the key |
| Instrument S/W Revision | A.02.00 |

Amplitude Lets you edit the Amplitude of the current row.

| | |
|-------------------------|--|
| Key Path | Input/Output, Corrections, Edit |
| Notes | There is no value readback on the key |
| Instrument S/W Revision | A.02.00 |

Insert Point Below Pressing this key inserts a point below the current point. The new point is a copy of the current point. And becomes the current point. The new point is not yet entered into the underlying table, and the data in the row is displayed in Light Gray.

| | |
|-------------------------|--|
| Key Path | Input/Output, Corrections, Edit |
| Instrument S/W Revision | A.02.00 |

Delete Point This is an immediate action key. It will immediately delete the currently-selected point, whether or not that point is being edited, and select Navigate. The point following the currently-selected point (or the point preceding if there is none) will be selected.

| | |
|-------------------------|--|
| Key Path | Input/Output, Corrections, Edit |
| Instrument S/W Revision | A.02.00 |

Scale X Axis Matches the X Axis to the selected Correction, as well as possible. Sets the Start and Stop

Frequency to contain the minimum and maximum Frequency of the selected Correction. The range between Start Frequency and Stop Frequency is 12.5% above the range between the minimum and maximum Frequency so that span exceeds this range by one graticule division on either side. If in zero-span, or there is no data in the Ampcor table, or the frequency range represented by the table is zero, no action is taken. Standard clipping rules apply, if the value in the table is outside the allowable range for the X axis.

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

Delete Correction

Deletes the correction values for this set. When this key is pressed a prompt is placed on the screen that says “Please press Enter or OK key to delete correction. Press ESC or Cancel to close this dialog.” The deletion is only performed if you press OK or Enter; if so, after the deletion, the informational message “Correction deleted” appears in the MSG line.

Remote Command: [:SENSE]:CORRection:CSET[1|2|3|4]:DELeTe

Example: CORR:CSET:DEL
 CORR:CSET1:DEL
 CORR:CSET4:DEL

Key Path: **Input/Output, Corrections**

Instrument S/W Revision: A.02.00

Apply Corrections

Applies amplitude corrections which are marked as ON to the measured data. If this is set to NO, then no amplitude correction sets will be used, regardless of their individual on/off settings. If set to YES, then the corrections that are marked as ON (see [“Correction On/Off” on page 535](#)) will be used.

Remote Command: [:SENSE]:CORRection:CSET:ALL[:STATE] ON|OFF|1|0
 [:SENSE]:CORRection:CSET:ALL[:STATE]?

Example: SENS:CORR:CSET:ALL OFF
 This command makes sure that no amplitude corrections are applied, regardless of their individual on/off settings.

Preset: Not affected by Preset. Set to OFF by Restore Input/Output Defaults

State Saved: Saved in state

Key Path: **Input/Output, Corrections**

Instrument S/W Revision: A.02.00

Input/Output

Delete All Corrections

Erases all correction values for all 4 Amplitude Correction sets.

When this key is pressed a prompt is placed on the screen that says “Please press Enter or OK key to delete all corrections. Press ESC or Cancel to close this dialog.” The deletion is only performed if you press OK or Enter; if so, after the deletion, the informational message “All Corrections deleted” appears in the MSG line.

Remote Command: [:SENSe]:CORRection:CSET:ALL:DELeTe

Example: CORR:CSET:ALL:DEL

Key Path: **Input/Output, Corrections**

Instrument S/W Revision: A.02.00

Remote Correction Data Set Commands

Set (Replace) Data (Remote Command Only) The command takes an ASCII series of alternating frequency and amplitude points, each value separated by commas.

The values sent in the command will totally replace all existing correction points in the specified set. An Ampcor array can contain 2000 points maximum.

Remote Command: [:SENSe]:CORRection:CSET[1]|2|3|4:DATA <freq>, <ampl>, .
. . .
[:SENSe]:CORRection:CSET[1]|2|3|4:DATA?

Example: CORR:CSET1:DATA 10000000,-1.0,20000000,1.0

This defines two correction points at (10 MHz, -1.0 dB) and (20 MHz, 1.0 dB) for correction set 1.

Preset: Empty after Restore Input/Output Defaults. Survives shutdown/restart of analyzer application (including power cycle)

State Saved: Saved in state

Min: Freq: 0 Hz
Amptd: -1000 dBm

Max: Freq: 1 THz
Amptd: +1000 dBm

Instrument S/W Revision: A.02.00

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

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

An Ampcor array can contain 2000 total points, maximum.

| | |
|--------------------------|--|
| Remote Command: | <code>[:SENSE] :CORRection:CSET[1 2 3 4 :DATA:MERGe <freq> , <amp1> , ...</code> |
| Example: | <code>CORR:CSET1:DATA:MERGE 15000000,-5.0,25000000,5.0</code> This adds two correction points at (15 MHz, -5.0 dB) and (25 MHz, 5.0 dB) to whatever values already exist in correction set 1. |
| Preset: | Empty after Restore Input/Output Defaults. Survives shutdown/restart of analyzer application (including power cycle) |
| Min: | Freq: 0 Hz Amptd: -1000 dBm |
| Max: | Freq: 1 THz Amptd: +1000 dBm |
| Instrument S/W Revision: | A.02.00 |

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> |
|------------------------|--|

Input/Output

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: Prior to A.02.00

Remote Command: [:SENSe]:ROSCillator:SOURce?

Remote Command Notes: The query [SENSe]:ROSCillator:SOURce? returns the current switch setting. This means:

1. If it was set to SENSE but there is no external reference 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: Prior to A.02.00

Remote Command: [:SENSe]:ROSCillator:SOURce INTERNAL|EXTERNAL

Instrument S/W Revision: Prior to A.02.00

Sense

The external reference is used if a valid signal is sensed at the Ext Ref input. Otherwise the internal reference is used.

Example: :ROSC:SOUR:TYPE SENS

Key Path: **Input/Output, Freq Ref In**

Readback: Sense

Instrument S/W Revision: Prior to A.02.00

Internal

The internal reference is used.

Example: :ROSC:SOUR:TYPE INT

Key Path: **Input/Output, Freq Ref In**
 Readback: Internal
 Instrument S/W Revision: Prior to A.02.00

External

The external reference is used.

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

Ext Ref Freq

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

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

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

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: Prior to A.02.00

External Ref Coupling

Only appears with option ERC installed and licensed.

This function lets you couple the sweep system of the analyzer to the state of the External Reference. If **Normal** is selected, data acquisition proceeds regardless of the state of the External Reference. When you select **Ext Ref Out Of Range Stops Acquisition**, the data acquisition (sweep or measurement) stops when either the "521, External ref out of range" or the "503, Frequency Reference unlocked" error is asserted. Note that this will only take place if the **Freq Ref In** selection is **External**.

With the acquisition stopped, the data display will stop updating (even if this occurs in the middle of a sweep or measurement) and no data will be returned to a READ? or MEASure? query; that is to say, these queries will not complete because the analyzer will not respond to them. Furthermore, no response will be generated to a *WAI? or *OPC? query.

Proper SCPI sequences are shown below, which will always fail to return if the acquisition stops during the requested sweep or measurement. Note that, for predictable operation of this function, it is best to operate the analyzer in single measurement mode (INIT:CONT OFF), because if operating in continuous mode, the analyzer may respond to the above queries even after the acquisition stops, with data left over from the previous acquisition.

```
:INIT:CONT OFF
```

```
:INIT:IMM;*OPC?
```

```
--
```

```
:INIT:CONT OFF
```

```
:INIT:IMM;*WAI?
```

```
--
```

```
:INIT:CONT OFF
```

```
:READ?
```

```
--
```

```
:INIT:CONT OFF
```

```
:MEASure?
```

When the acquisition ceases, in addition to the error condition(s) described above, an error message will be generated informing you that the acquisition has ceased due to an invalid external reference. This message will stay on the screen while the acquisition is suspended.

External reference problem.
 Data acquisition suspended.
 To resume data acquisition, fix the
 problem and press the Restart key
 OR
 Press the following keys:
 Input/Output, More 1 of 2, Freq Ref In,
 External Ref Coupling, Normal
 OR
 Input/Output, More 1 of 2,
 Freq Ref In, Internal

If you press the Restart key this message will be taken off the screen and a new acquisition will be attempted; if the External Reference problem persists the message will go right back up. You can also take the message down by changing back to the **Normal** setting of Sweep/Ext Ref Coupling, or by pressing **Freq Ref In, Internal**, or **Freq Ref In, Sense**, or **Restore Input/Output Defaults**.

The setting of **External Ref Coupling** is persistent across power-cycling and is not reset with **Preset**. It is reset to the default state (**Normal**) when **Restore Input/Output Defaults** is invoked, which will also restart normal data acquisition.

The detection of invalid external reference is under interrupt processing. If the external reference becomes invalid then returns to valid in too short a time, no error condition will be detected or reported and therefore the acquisition will not be stopped.

| | |
|-------------------------|--|
| Remote Command | [:SENSE]:ROSCillator:COUpling NORMal NACquisition [:SENSe]:ROSCillator:COUpling? |
| Mode | All |
| Preset | This setting is persistent: it survives power-cycling or Preset and is reset with Restore Input/Output defaults. |
| State Saved | Not saved in State |
| Readback | Normal Stop Acq |
| Key Path: | Input/Output, Freq Ref In |
| Instrument S/W Revision | A.02.00 |

Output Config

Accesses keys that configure various output settings, like the frequency reference output, trigger output and analog output.

| | |
|-------------------------|---------------------|
| Key Path | Input/Output |
| Instrument S/W Revision | Prior to A.02.00 |

Input/Output

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: Prior to A.02.00

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?

Example: TRIG1:OUTP:POL POS

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: Prior to A.02.00

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**

Readback: Sweeping

Instrument S/W Revision: Prior to A.02.00

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**
 Readback: Measuring
 Instrument S/W Revision: Prior to A.02.00

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**
 Readback: Main Trigger
 Instrument S/W Revision: Prior to A.02.00

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**
 Readback: Gate Trigger
 Instrument S/W Revision: Prior to A.02.00

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**
 Readback: Gate
 Instrument S/W Revision: Prior to A.02.00

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**

Input/Output

Readback: Odd/Even
Instrument S/W Revision: Prior to A.02.00

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**
Readback: Off
Instrument S/W Revision: Prior to A.02.00

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 Prior to A.02.00

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

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.

Instrument S/W Revision Prior to A.02.00

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.

Remote Command :OUTPut:IQ:OUTPut IQ1|IQ250|OFF
:OUTPut:IQ:OUTPut?

| | |
|-------------------------|---|
| 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 |
| Key Path | Input/Output, Output Config |
| Preset | Off |
| State Saved | Saved in instrument state. |
| Range | 1 kHz Square Wave 250 kHz Square Wave Off |
| Readback Text | 1 kHz 250 kHz Off |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Readback | I/Q 1kHz |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Readback | I/Q 250kHz |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Readback | Off |
| Instrument S/W Revision | Prior to A.02.00 |

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.

Input/Output

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.

| | |
|-------------------------|--|
| 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 |
| Key Path | Input/Output, I/Q, I/Q Cable Calibration |
| State Saved | No. |
| Instrument S/W Revision | Prior to A.02.00 |

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

| | |
|-------------------------|---|
| 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 562). |
| Key Path | Input/Output, I/Q, I/Q Cable Calibration |
| Instrument S/W Revision | Prior to A.02.00 |

I/Q Isolation Calibration Time (Remote Only)

Return the last date and time that the I/Q Isolation Calibration was performed. This is a remote query command only.

| | |
|--------------------------|--|
| Remote Command: | :CALibration:IQ:ISOLation:TIME? |
| Example: | :CAL:IQ:ISOL:TIME? |
| Restriction and Notes: | This returns 6 integer values: year, month, day, hour, minute, second. When no calibration has been performed, all values will be 0. |
| Instrument S/W Revision: | A.02.00 |

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 | Prior to A.02.00 |

Next Perform the I port calibration.

| | |
|-----------------------|--|
| 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. |

Input/Output

| | |
|-------------------------|---|
| Remote Command Notes | The I port must be connected to the Cal Out port before issuing the SCPI command. |
| Example | CAL:IQ:FLAT:I |
| Key Path | Input/Output, I/Q, I/Q Cable Calibration |
| State Saved | No. |
| Instrument S/W Revision | Prior to A.02.00 |

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

| | |
|-------------------------|--|
| 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 562). |
| Key Path | Input/Output, I/Q, I/Q Cable Calibration |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|--|
| 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. |
| Key Path | Input/Output, I/Q, I/Q Cable Calibration |
| Instrument S/W Revision | Prior to A.02.00 |

Next Perform the I-bar port calibration.

| | |
|-----------------------|--|
| Remote Command | :CALibration:IQ:FLATness:IBAR |
| 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-bar port must be connected to the Cal Out port before issuing the SCPI command. |
| Example | CAL:IQ:FLAT:IBAR |

| | |
|-------------------------|---|
| Key Path | Input/Output, I/Q, I/Q Cable Calibration |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

| | |
|-----------------------|--|
| 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 562). |
|-----------------------|--|

| | |
|-------------------------|---|
| Key Path | Input/Output, I/Q, I/Q Cable Calibration |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-----------------------|--|
| 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. |
|-----------------------|--|

| | |
|-------------------------|---|
| Key Path | Input/Output, I/Q, I/Q Cable Calibration |
| Instrument S/W Revision | Prior to A.02.00 |

Next Perform the Q port calibration.

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

| | |
|-------------------------|---|
| Key Path | Input/Output, I/Q, I/Q Cable Calibration |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |

Input/Output

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

| | |
|-------------------------|---|
| 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 562). |
| Key Path | Input/Output, I/Q, I/Q Cable Calibration |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|--|
| 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. |
| Key Path | Input/Output, I/Q, I/Q Cable Calibration |
| Instrument S/W Revision | Prior to A.02.00 |

Next Perform the Q-bar port calibration.

| | |
|-------------------------|--|
| Remote Command | <code>:CALibration:IQ:FLATness:QBAR</code> |
| 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-bar port must be connected to the Cal Out port before issuing the SCPI command. |
| Example | <code>CAL:IQ:FLAT:QBAR</code> |
| Key Path | Input/Output, I/Q, I/Q Cable Calibration |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired

calibration data.

| | |
|-------------------------|--|
| 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 562). |
| Key Path | Input/Output, I/Q, I/Q Cable Calibration |
| Instrument S/W Revision | Prior to A.02.00 |

I/Q Cable Calibration Time (Remote Only) Return the last date and time that the I/Q Cable Calibration was performed for a specific port. This is a remote query command only.

| | |
|--------------------------|--|
| Remote Command: | :CALibration:IQ:FLATness:I IBAR Q QBAR:TIME? |
| Example: | :CAL:IQ:FLAT:I:TIME? |
| Restriction and Notes: | This returns 6 integer values: year, month, day, hour, minute, second. When no calibration has been performed, all values will be 0. |
| Instrument S/W Revision: | A.02.00 |

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 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.

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

Input/Output

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 relevant port will be displayed. For passive probes with Differential On, any calibration that is 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 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 will show 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 562](#).

| | |
|-------------------------|---|
| Restriction and Notes | Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached. |
| Key Path | Input/Output, I/Q, I Setup, I Probe, Calibrate |
| Instrument S/W Revision | Prior to A.02.00 |

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 | Prior to A.02.00 |

Next Perform the I port calibration.

| | |
|-------------------------|---|
| Remote Command | <code>:CALibration:IQ:PROBe:I</code> |
| 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 will survive power cycles. It is not reset by any preset or restore data commands. |
| Example | <code>CAL:IQ:PROB:I</code> |
| Key Path | Input/Output, I/Q, I Setup, I Probe, Calibrate |
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired

calibration data.

| | |
|-------------------------|--|
| 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 562). |
| Key Path | Input/Output, I/Q, I Setup, I Probe, Calibrate |
| Instrument S/W Revision | Prior to A.02.00 |

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 will show 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 562](#).

| | |
|-------------------------|---|
| Restriction and Notes | Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached. |
| Key Path | Input/Output, I/Q, I Setup, I Probe, Calibrate |
| Instrument S/W Revision | Prior to A.02.00 |

Back Return to the prior step in the calibration procedure.

| | |
|-------------------------|--|
| 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. |
| Key Path | Input/Output, I/Q, I Setup, I Probe, Calibrate |
| Instrument S/W Revision | Prior to A.02.00 |

Next Perform the I-bar port calibration.

| | |
|-----------------------|---|
| 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 will survive power cycles. It is not reset by any preset or restore data commands. |
| Example | CAL:IQ:PROB:IB |
| Key Path | Input/Output, I/Q, I Setup, I Probe, Calibrate |
| State Saved | No |

Input/Output

Instrument S/W Revision Prior to A.02.00

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

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 562](#)).

Key Path **Input/Output, I/Q, I Setup, I Probe, Calibrate**

Instrument S/W Revision Prior to A.02.00

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 will show 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 562](#).

Restriction and Notes Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached.

Key Path **Input/Output, I/Q, Q Setup, Q Probe, Calibrate**

Instrument S/W Revision Prior to A.02.00

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 Prior to A.02.00

Next Perform the Q port calibration.

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 will survive power cycles. It is not reset by any preset or restore data commands.

Example CAL:IQ:PROB:Q

Key Path **Input/Output, I/Q, Q Setup, Q Probe, Calibrate**

State Saved No

Instrument S/W Revision Prior to A.02.00

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

| | |
|-------------------------|---|
| 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 562). |
| Key Path | Input/Output, I/Q, Q Setup, Q Probe, Calibrate |
| Instrument S/W Revision | Prior to A.02.00 |

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 will show 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 562.

| | |
|-------------------------|---|
| Restriction and Notes | Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached. |
| Key Path | Input/Output, I/Q, Q Setup, Q Probe, Calibrate |
| Instrument S/W Revision | Prior to A.02.00 |

Back Return to the prior step in the calibration procedure.

| | |
|-------------------------|--|
| 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. |
| Key Path | Input/Output, I/Q, Q Setup, Q Probe, Calibrate |
| Instrument S/W Revision | Prior to A.02.00 |

Next Perform the Q-bar port calibration.

| | |
|-----------------------|---|
| Remote Command | <code>:CALibration:IQ:PROBe:QBar</code> |
| 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 will survive power cycles. It is not reset by any preset or restore data commands. |
| Example | <code>CAL:IQ:PROB:QB</code> |
| Key Path | Input/Output, I/Q, Q Setup, Q Probe, Calibrate |

Input/Output

| | |
|-------------------------|------------------|
| State Saved | No |
| Instrument S/W Revision | Prior to A.02.00 |

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

| | |
|-------------------------|---|
| 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 562). |
| Key Path | Input/Output, I/Q, Q Setup, Q Probe, Calibrate |
| Instrument S/W Revision | Prior to A.02.00 |

Show Adapter Screen When one of the Probe Calibration Show Adapter buttons is pressed, a diagram of the probe with its adapter will be shown. Depending on the type of probe attached, either the Passive Probe Adapter or the Active Probe Adapter diagram will be shown.

I/Q Probe Calibration Time (Remote Only) Return the last date and time that the I/Q Probe Calibration was performed for a specific port. This is a remote query command only.

| | |
|--------------------------|--|
| Remote Command: | :CALibration:IQ:PROBe:I IBAR Q QBAR:TIME? |
| Example: | :CAL:IQ:PROB:I:TIME? |
| Restriction and Notes: | This returns 6 integer values: year, month, day, hour, minute, second. When no calibration has been performed, all values will be 0. The value is specific to both the port and probe, so the value will change as probes are connected or disconnected. |
| Instrument S/W Revision: | A.02.00 |

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 and others with old data. If this is the case, a dialog box will appear to confirm that you really want to exit. A "Yes" answer will exit the calibration procedure, leaving potentially inconsistent calibration data in place. A "No" answer will return to the calibration procedure.

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 | Prior to A.02.00 |

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 | Prior to A.02.00 |

Marker Function

Marker To

Some Marker To 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 | Prior to A.02.00 |

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:

NOTE Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

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

Remote Measurement Functions

This section contains the following topics:

[“Measurement Group of Commands” on page 570](#)

[“Current Measurement Query \(Remote Command Only\)” on page 574](#)

[“Limit Test Current Results \(Remote Command Only\)” on page 575](#)

[“Data Query \(Remote Command Only\)” on page 575](#)

[“Calculate/Compress Trace Data Query \(Remote Command Only\)” on page 575](#)

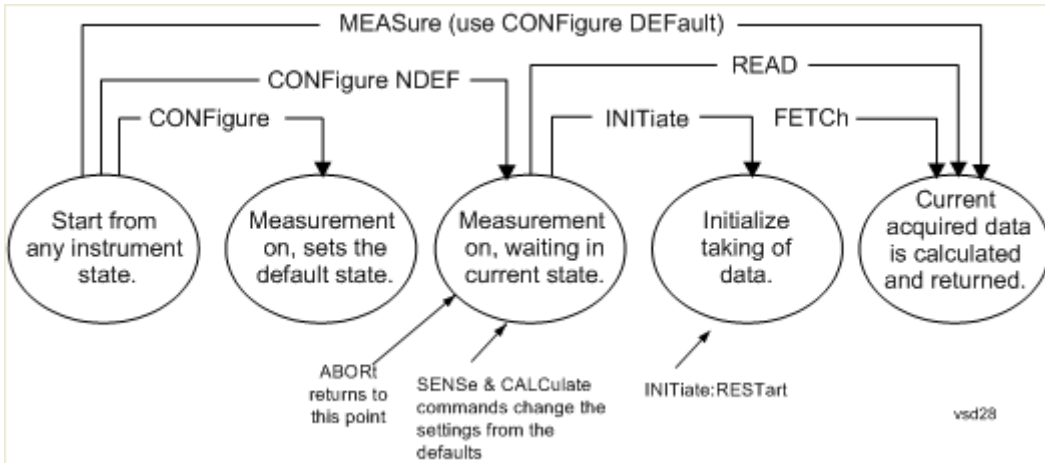
[“Calculate Peaks of Trace Data \(Remote Command Only\)” on page 580](#)

[“Format Data: Numeric Data \(Remote Command Only\)” on page 582](#)

[“Format Data: Byte Order \(Remote Command Only\)” on page 584](#)

| | |
|-------------------------|------------------|
| Instrument S/W Revision | Prior to A.02.00 |
|-------------------------|------------------|

Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.

ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFigure command. Use the commands in the SENSE:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSE:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:**:CONFigure:<measurement>**

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: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.

The **CONFigure:CATalog?** query returns a quoted string of all measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error is reported if a measurement other than the current one, is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
- For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
- Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
- If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.
- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.

For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.

- Blocks other SCPI communication, waiting until the measurement is complete before returning the results

If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format.
(FORMat:DATA)

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Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

Remote Command: :CONFigure?

Example: CONF?
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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.

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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.

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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

Meas

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.)

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- **BLOCK** or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)
- **CFIT** or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, **MAX**, **MEAN**, **DME**, **RMS**, **RMSC**, **SAMP**, **SDEV** and **PPH** return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- **MINimum** - returns the minimum data point (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.

NOTE If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1
Mean Value of Data Points for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i \quad \text{vsd27-1}$$

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.

NOTE 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).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2} \quad \text{vsd27-8}$$

where $|X_i|$ is the magnitude of an I/Q pair, X is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector (n=0) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

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:

$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

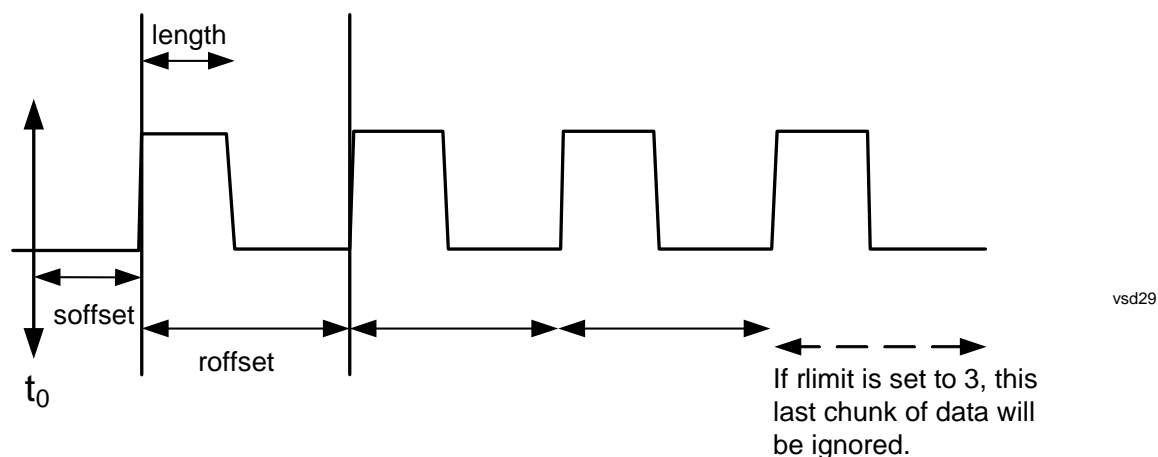
vsd27-10

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.

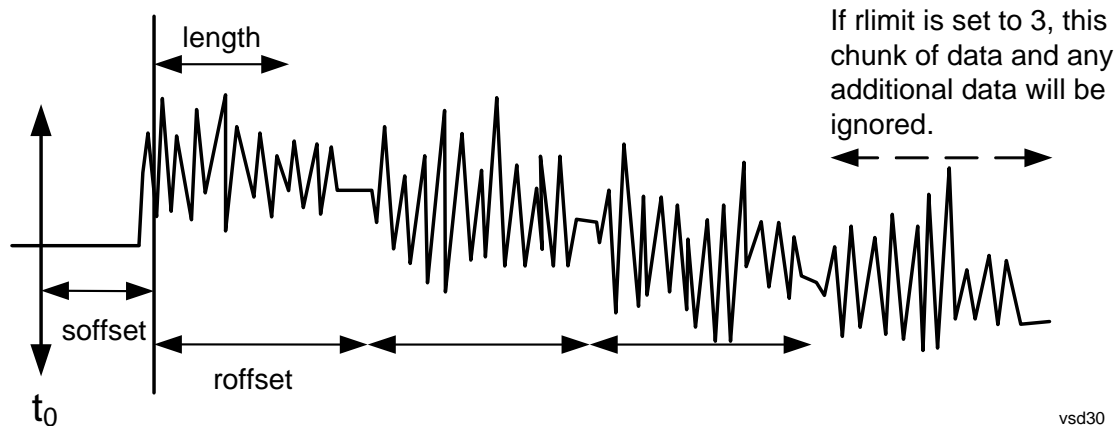
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<offset> - 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.

Meas

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: Prior to A.02.00

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

Remote Command: :FORMat [:TRACe][[:DATA] ASCii|INTeger,32|REAL,32 |REAL,64
:FORMat [:TRACe][[:DATA]]?

| | |
|--------------------------|---|
| 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: | Prior to A.02.00 |

The specs for each output type follow:

ASCIi - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYYEsZZ

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: Prior to A.02.00

Meas Setup

Meas Control features are unique to each Measurement. See the specific Measurement for more information.

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

Meas Setup

Mode

The Mode key allows you to select the available measurement applications. The application software must be licensed in order 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 application software product is ordered separately by Model Number.

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

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

Once an instrument mode is selected, only the commands that are valid for that mode can be executed. A list of the valid mode choices is returned with the INST:CAT? Query.

It is possible to specify the order in which the Modes appear in the Mode menu, using the Configure Applications utility (**System, Power On, Configure Applications**). It is also possible, using the same utility, to specify a subset of the available applications to load at startup time, which can significantly decrease the startup time of the analyzer. If this is done, then during runtime, if an application which is not loaded into memory is selected by you using the Mode menu or by sending SCPI commands, there will be a significant pause while the Application is loaded. During this pause a message box which says “Loading application ...” is displayed.

| | |
|-------------------------|--|
| Remote Command | :INSTrument [:SElect] SA BASIC ADEMOD NFIGURE PNOISE CDMA2K TDSCDMA VSA VSA89 601 WCDMA WIMAXOFDMA EDGE 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. |
| Key Path | Front-panel key |
| 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 | Prior to A.02.00 |

Mode

Application Mode Number Selection (Remote Command only)

Select the measurement mode by its mode number. The actual available choices depend upon which applications are installed in your instrument. The modes appear in this table by NSEL number, which is not the same as their order in the Mode menu (see “Detailed List of Modes” on page 592 for the mode order).

| 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/EDGE Evo | 13 | EDGE GSM |
| Phase Noise | 14 | PNOISE |
| 1xEV-DO | 15 | CDMA1XEV |
| Combined WLAN | 19 | CWLAN |
| 802.16 OFDMA (WiMAX/WiBro) | 75 | WIMAXOFDMA |
| Combined Fixed WiMAX | 81 | CWIMAXOFDM |
| Vector Signal Analyzer (VXA) | 100 | VSA |
| 89601 VSA | 101 | VSA89601 |
| LTE | 102 | LTE |
| iDEN/WiDEN/MotoTalk | 103 | IDEN |
| 802.16 OFDM (Fixed WiMAX) | 104 | WIMAXFIXED |
| TD-SCDMA with HSPA/8PSK | 211 | TDSCDMA |
| Noise Figure | 219 | NFIGURE |
| Analog Demod | 234 | ADEMODO |
| DVB-T/H | 235 | DVB |
| DTMB | 236 | DTMB |
| Remote Language Compatibility | 266 | RLC |

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: | Prior to A.02.00 |

Application Mode Catalog Query (Remote Command only)

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

| | |
|--------------------------|---|
| Remote Command: | :INSTrument :CATalog? |
| Example: | :INST:CAT? |
| 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: | Prior to A.02.00 |

Application Identification (Remote Commands only)

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

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

Current Application Model

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 |

Mode

State Saved: Not saved in state, the value will be the selected application when Save is done.

Instrument S/W Revision: Prior to A.02.00

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: Prior to A.02.00

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: Prior to A.02.00

Application Identification Catalog (Remote Commands only)

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

Application Catalog number of entries

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: Prior to A.02.00

Application Catalog Model Numbers

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

Remote Command: :SYSTem:APPLication:CATalog[:NAME]?

Example: :SYST:APPL:CAT?

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: Prior to A.02.00

Application Catalog Revision

Returns the Revision of the provided Model Number.

Remote Command: :SYSTem:APPLication:CATalog:REVision? <model>

Example: :SYST:APPL:CAT:REV? 'N9060A'

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"

Mode

| | |
|--------------------------|------------------------|
| Preset: | Not affected by Preset |
| State Saved: | Not saved in state. |
| Instrument S/W Revision: | Prior to A.02.00 |

Application Catalog Options

Returns a list of Options for the provided Model Number

| | |
|--------------------------|---|
| Remote Command: | :SYSTem:APPLication:CATalog:OPTion? <model> |
| Example: | :SYST:APPL:CAT:OPT? 'N9060A' |
| 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: | Prior to A.02.00 |

Detailed List of Modes

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.

| | |
|-------------------------|----------------------------|
| Example | INST:SEL SA INST:NSEL 1 |
| Key Path | Mode |
| Instrument S/W Revision | Prior to A.02.00 |

IQ Analyzer (Basic)

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

measurements can be used to output I/Q data results when measuring complex modulated digital signals. If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

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

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.

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

GSM/EDGE/EDGE Evo

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

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

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

802.16 OFDMA (WiMAX/WiBro)

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

If you are using the Help feature, this mode must be currently active to access its detailed information. If

Mode

it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

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

Vector Signal Analyzer (VXA)

The 89601X Vector Signal Analyzer 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.

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

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.

| | |
|-------------------------|---------------------------------------|
| Example | INST:SEL PNOISE or INST:NSEL 14 |
| Key Path | Mode |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|------------------|
| Example | INST:SEL NFIGURE |
| | Or |
| | INST:NSEL 219 |
| Key Path | Mode |
| Instrument S/W Revision | Prior to A.02.00 |

Analog Demod

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

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

| | |
|-------------------------|------------------|
| Example | INST:SEL ADEMOM |
| | INST:NSEL 234 |
| Key Path | Mode |
| Instrument S/W Revision | Prior to A.02.00 |

TD-SCDMA with HSPA/8PSK

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

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

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

cdma2000

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

If you are using the Help feature, this mode must be currently active to access its detailed information. If

Mode

it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

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

1xEV-DO

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

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

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

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.

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

DVB-T/H

Selects the DVB-T/H mode for measurements of digital video signals using this format. There are several power and demod 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.

| | |
|----------|-------------------------------|
| Example | INST:SEL DVB INST:NSEL 235 |
| Key Path | Mode |

Instrument S/W Revision A.02.00

DTMB

Selects the DTMB mode for measurements of digital video signals using this format. There are several power and demod 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.

Example INST:SEL DTMB
 INST:NSEL 236

Key Path **Mode**

Instrument S/W Revision A.02.00

Combined WLAN

Selects the CWLAN 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.

Example INST:SEL CWLAN
 INST:NSEL 19

Key Path **Mode**

Instrument S/W Revision A.02.00

Combined Fixed WiMAX

Selects the Combined Fixed WiMAX 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.

Example INST:SEL CWIMAXOFDM
 INST:NSEL 81

Key Path **Mode**

Instrument S/W Revision A.02.00

802.16 OFDM (Fixed WiMAX)

Selects the 802.16 OFDM (Fixed WiMAX) mode. This mode allows modulation quality measurements of signals that comply with IEEE 802.16a–2003 and IEEE 802.16–2004 standards, with flexibility to measure nonstandard OFDM formats. Along with the typical digital demodulation measurement results,

Mode

several additional 802.16 OFDM unique trace data formats and numeric error data results provide enhanced data analysis.

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 WIMAXFIXED INST:NSEL 104 |
| Instrument S/W Revision | A.02.00 |

iDEN/WiDEN/MOTOTalk

Selects the iDEN/WiDEN/MOTOTalk mode for general purpose measurements of iDEN and iDEN-related 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.

| | |
|-------------------------|--------------------------------|
| Example | INST:SEL IDEN INST:NSEL 103 |
| Key Path | Mode |
| Instrument S/W Revision | A.02.00 |

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.

NOTE After changing into or out of RLC mode, allow a 1 second delay before sending any subsequent commands.

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.

| | |
|-------------------------|-------------------------------------|
| Example | INST:SEL RLC Or INST:NSEL 266 |
| Key Path | Mode |
| Instrument S/W Revision | Prior to A.02.00 |

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.

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

Mode

Mode Setup

This key accesses a menu allowing you to set various parameters for all iDEN/WiDEN/MotoTalk Analyzer measurements.

| | |
|--------------------------|--------------------|
| Key Path: | Front Panel |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

Spectrum

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

| | |
|--------------------------|---|
| Key Path: | Mode |
| Mode: | IDEN |
| Remote Command: | [:SENSe] :SPEcTrum NORMal INVert [:SENSe] :SPEcTrum? |
| Example: | SPEC INV SPEC? |
| Preset: | NORM |
| State Saved: | Saved in instrument state. |
| Range: | Normal Invert |
| Instrument S/W Revision: | A.02.00 |

Fixed Equalization

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

| | |
|--------------------------|-------------------|
| Key Path: | Mode Setup |
| Mode: | IDEN |
| Instrument S/W Revision: | A.02.00 |

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

Mode Setup

register. Invert mode multiplies instead of dividing.

| | |
|--------------------------|---|
| Key Path: | Mode Setup, Fixed Equalization |
| Mode: | IDEN |
| 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 |
| Instrument S/W Revision: | A.02.00 |

Freq Response Register

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

| | |
|--------------------------|--|
| Key Path: | Mode Setup, Fixed Equalization |
| Mode: | IDEN |
| 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 |
| Instrument S/W Revision: | A.02.00 |

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 part, or the entire measurement span falls outside the data register's frequency span. It can be desirable when measuring across frequency converters, but should be used with caution. Be careful to use a measurement span that is equal to or narrower than the span of the data register.

| | |
|--------------------------|--|
| Mode: | IDEN |
| Remote Command: | [:SENSE] :CORRection:FEQualizer:RELative? |
| Example: | CORR:FEQ:REL? |
| Notes: | Returns 1 if fixed equalizer frequency mapping is relative; 0 otherwise. |
| Instrument S/W Revision: | A.02.00 |

Radio Standards

The iDEN/WiDEN/MotoTalk Analyzer is used for testing iDEN, WiDEN and MotoTalk radio standards.

This menu accesses the modulation format selections and global parameters for the iDEN/WiDEN standards.

| | |
|--------------------------|-------------------|
| Key Path: | Mode Setup |
| Instrument S/W Revision: | A.02.00 |

MQAM Format

This softkey selects the submenu for the MQAM modulation format.

| | |
|--------------------------|---|
| Key Path: | Mode Setup, iDEN/WiDEN |
| Mode: | IDEN |
| Remote Command: | [:SENSE] :RADio:IDEN:FORMat M4QAM M16QAM M64QAM [:SENSE] :RADio:IDEN:FORMat? |
| Example: | :RAD:IDEN:FORM M16QAM |
| Couplings: | No |
| Preset: | M16QAM |
| State Saved: | Saved in instrument state. |
| Range: | M4QAM M16QAM M64QAM |
| Instrument S/W Revision: | A.02.00 |

Mode Setup

M4QAM This softkey selects M4QAM MQAM Modulation Format.

Key Path: **Mode Setup, iDEN/WiDEN, MQAM Format**
Mode: IDEN
Instrument S/W Revision: A.02.00

M16QAM This softkey selects M16QAM MQAM Modulation Format.

Key Path: **Mode Setup, iDEN/WiDEN, MQAM Format**
Mode: IDEN
Instrument S/W Revision: A.02.00

M64QAM This softkey selects M64QAM MQAM Modulation Format.

Key Path: **Mode Setup, iDEN/WiDEN, MQAM Format**
Mode: IDEN
Instrument S/W Revision: A.02.00

Slot Format

This softkey selects the submenu for the iDEN or WiDEN slot format.

Key Path: **Mode Setup, iDEN/WiDEN**
Mode: IDEN
Remote Command: [:SENSe]:RADio:IDEN:SLOT
TCHFull | RAP | TCHN61 | TCHN61T | TCHE61 | WiDen | OTCFull | OTCN61
[:SENSe]:RADio:IDEN:SLOT?
Example: :RAD:IDEN:SLOT TCHF
Couplings: Changing this to/from iDEN and WiDEN slot formats when the WiDEN Carrier Config is wider than 25 kHz will cause the Span to be changed to accommodate the different bandwidth signal.
Changing to an Outbound Slot Format from an Inbound Slot Format will cause the Free Run trigger to be selected and Search Length preset to accommodate slot latency.
The X Scaling of the PvT Rise & Fall displays may also be changed as necessary for proper viewing of these regions.
Preset: TCHFull
State Saved: Saved in instrument state.

Range: Full Slot Reserved (Inbound) | Random Access (Inbound) | New 6:1 Reserved Pseudo (Inbound) | New 6:1 Reserved Training (Inbound) | Full Slot Enhanced 6:1 (Inbound) | WiDEN (Inbound) | Full Slot Reserved (Outbound) | New 6:1 Reserved (Outbound)

Readback Text: In Full Slot Reserved | In Random Access | In New 6:1 Res Pseudo | In New 6:1 Res Training | In Full Slot Enhanced 6:1 | In WiDEN | Out Full Slot Reserved | Out New 6:1 Reserved

Instrument S/W Revision: A.02.00

Mapping between the Key Name and the SCPI parameter:

| Key Name | SCPI |
|-------------------------------------|---------|
| Full Slot Reserved (Inbound) | TCHFull |
| Full Slot Random Access (Inbound) | RAPFull |
| New 6:1 Reserved Pseudo (Inbound) | TCHN61 |
| New 6:1 Reserved Training (Inbound) | TCHN61T |
| Full Slot Enhanced 6:1 (Inbound) | TCHE61 |
| WiDEN (Inbound) | WIDen |
| Full Slot Reserved (Outbound) | OTCFull |
| New 6:1 Reserved (Outbound) | OTCN61 |

Full Slot Reserved (Inbound) This softkey selects the Full Slot Reserved Access iDEN Inbound Slot Format.

Key Path: **Mode Setup, iDEN/WiDEN, Slot Format**

Mode: IDEN

Instrument S/W Revision: A.02.00

Random Access (Inbound) This softkey selects the Random Access iDEN Inbound Slot Format.

Key Path: **Mode Setup, iDEN/WiDEN, Slot Format**

Mode: IDEN

Instrument S/W Revision: A.02.00

New 6:1 Reserved Pseudo (Inbound) This softkey selects the New 6:1 Reserved Access iDEN Inbound Slot Format.

Key Path: **Mode Setup, iDEN/WiDEN, Slot Format**

Mode: IDEN

Mode Setup

Instrument S/W Revision: A.02.00

New 6:1 Reserved Training (Inbound) This softkey selects the Full Slot Reserved with Training iDEN Inbound Slot Format.

Key Path: **Mode Setup, iDEN/WiDEN, Slot Format**

Mode: IDEN

Instrument S/W Revision: A.02.00

Full Slot Enhanced 6:1 (Inbound) This softkey selects the Full Slot Enhanced iDEN Inbound Slot Format.

Key Path: **Mode Setup, iDEN/WiDEN, Slot Format**

Mode: IDEN

Instrument S/W Revision: A.02.00

WiDEN (Inbound) This softkey selects the Inbound WiDEN Slot Format.

Key Path: **Mode Setup, iDEN/WiDEN, Slot Format**

Mode: IDEN

Instrument S/W Revision: A.02.00

Full Slot Reserved (Outbound) This softkey selects the Full Slot Reserved Access iDEN Outbound Slot Format.

Key Path: **Mode Setup, iDEN/WiDEN, Slot Format, More**

Mode: IDEN

Instrument S/W Revision: A.02.00

New 6:1 Reserved (Outbound) This softkey selects the New 6:1 Reserved Access iDEN Outbound Slot Format.

Key Path: **Mode Setup, iDEN/WiDEN, Slot Format, More**

Mode: IDEN

Instrument S/W Revision: A.02.00

Color Code

The color code is an integer denoting the 16 value color and the color code extension.

Key Path: **Mode Setup, iDEN/WiDEN**

| | |
|--------------------------|---|
| Mode: | IDEN |
| Remote Command: | [:SENSe]:RADio:IDEN:CCODE <integer> [:SENSe]:RADio:IDEN:CCODE? |
| Example: | :RAD:IDEN:CCOD 0 |
| Notes: | Set this parameter to Color Code Extension*16 + Color Code |
| Preset: | 0 |
| State Saved: | Saved in instrument state. |
| Min: | 0 |
| Max: | 95 |
| Instrument S/W Revision: | A.02.00 |

Carrier Config

Carrier Config is used only when WiDEN slot formats are active, it is ignored (grayed out) for other slot formats.

| | |
|--------------------------|--|
| Key Path: | Mode Setup, iDEN/WiDEN |
| Mode: | IDEN |
| Remote Command: | [:SENSe]:RADio:IDEN:WCARrier I25 I50 O50 I75 I100 [:SENSe]:RADio:IDEN:WCARrier? |
| Example: | :RAD:IDEN:WCAR I25 |
| Couplings: | The Span is adjusted to accommodate the WiDEN carriers. |
| Preset: | I25 |
| State Saved: | Saved in instrument state. |
| Range: | 25 kHz 50 kHz 50 kHz Outer 75 kHz 100 kHz |
| Instrument S/W Revision: | A.02.00 |

25 kHz This softkey selects the 25 kHz WiDEN Carrier Config.

| | |
|--------------------------|---|
| Key Path: | Mode Setup, iDEN/WiDEN, Carrier Config |
| Mode: | IDEN |
| Example: | :RAD:IDEN:WCAR I25 |
| Instrument S/W Revision: | A.02.00 |

50 kHz This softkey selects the 50 kHz WiDEN Carrier Config.

| | |
|-----------|---|
| Key Path: | Mode Setup, iDEN/WiDEN, Carrier Config |
|-----------|---|

Mode Setup

Mode: IDEN
Example: :RAD:IDEN:WCAR I50
Instrument S/W Revision: A.02.00

50 kHz Outer This softkey selects the 50 kHz Outer WiDEN Carrier Config (sometimes called 100 kHz Outer WiDEN Carrier Config).

Key Path: **Mode Setup, iDEN/WiDEN, Carrier Config**
Mode: IDEN
Example: :RAD:IDEN:WCAR O50
Instrument S/W Revision: A.02.00

75 kHz This softkey selects the 75 kHz WiDEN Carrier Config.

Key Path: **Mode Setup, iDEN/WiDEN, Carrier Config**
Mode: IDEN
Example: :RAD:IDEN:WCAR I75
Instrument S/W Revision: A.02.00

100 kHz This softkey selects the 100 kHz WiDEN Carrier Config.

Key Path: **Mode Setup, iDEN/WiDEN, Carrier Config**
Mode: IDEN
Example: :RAD:IDEN:WCAR I100
Instrument S/W Revision: A.02.00

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).

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 | Prior to A.02.00 |

Peak Search

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.

| | |
|-------------------------|---|
| 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>. |
| Key Path | Front-panel key |
| Instrument S/W Revision | Prior to A.02.00 |

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 have 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 option 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 614 . |
| Key Path | Recall |
| Mode | All |
| Instrument S/W Revision | Prior to A.02.00 |

In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with

Recall

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 do 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.

| | |
|----------|---|
| Example | *RCL 1 |
| Key Path | Recall, State |
| Readback | Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register. |

Instrument S/W Revision Prior to A.02.00

Example *RCL 2

Key Path **Recall, State**

Readback Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register.

Instrument S/W Revision Prior to A.02.00

Example *RCL 3

Key Path **Recall, State**

Readback Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register.

Instrument S/W Revision Prior to A.02.00

Example *RCL 4

Key Path **Recall, State**

Readback Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register.

Instrument S/W Revision Prior to A.02.00

Example *RCL 5

Key Path **Recall, State**

Readback Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register.

Instrument S/W Revision Prior to A.02.00

Example *RCL 6

Key Path **Recall, State**

Readback Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register.

Instrument S/W Revision Prior to A.02.00

From File\ File Open

Brings up the File Open standard Windows® dialog and its corresponding **File Open** key menu.

Recall

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 629](#).

| | |
|-------------------------|---|
| Restriction and Notes | Brings up Open dialog for recalling a State Save Type |
| Key Path | Recall, State |
| Instrument S/W Revision | Prior to A.02.00 |

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 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.

NOTE 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: Prior to A.02.00

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 have determined what you 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

Recall

trace you were 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 option 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 | <pre>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</pre> |
| Key Path | Recall |
| Mode | SA |
| Instrument S/W Revision | Prior to A.02.00 |

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 do 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 |
| Readback | Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register. |
| Instrument S/W Revision | Prior to A.02.00 |
| Key Path | Recall, Trace |

| | |
|-------------------------|---|
| Readback | Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register. |
| Instrument S/W Revision | Prior to A.02.00 |
| Key Path | Recall, Trace |
| Readback | Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register. |
| Instrument S/W Revision | Prior to A.02.00 |
| Key Path | Recall, Trace |
| Readback | Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register. |
| Instrument S/W Revision | Prior to A.02.00 |
| Key Path | Recall, Trace |
| Readback | Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register. |
| Instrument S/W Revision | Prior to A.02.00 |

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 | Prior to A.02.00 |

Open...

Pressing **Open** brings up the File Open standard Windows dialog and its corresponding File Open key menu. When you navigate to this selection, they have already determined they are recalling Trace and

Recall

now they want to specify from which file to do the recall.

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 *.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 629](#).

| | |
|-------------------------|---|
| Restriction and Notes | Brings up Open dialog for recalling a Trace Save Type |
| Key Path | Recall, Trace |
| Mode | SA |
| Instrument S/W Revision | Prior to A.02.00 |

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 614](#) for details.

| | |
|-----------------------|--|
| 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 | :MMEMory:LOAD:TRACe TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6 , <filename> :MMEMory:LOAD:TRACe:REGister TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6 , <integer> |

| | |
|-------------------------|---|
| Remote Command Notes | <p>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></p> <p>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:</p> <p>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.</p> <p>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".</p> |
| Example | <p><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.</p> <p><code>:MMEM:LOAD:TRAC:REG TRACE1,2</code> restores the trace data in register 2 to Trace 1</p> |
| Key Path | Recall, Trace, Open... |
| Instrument S/W Revision | Prior to A.02.00 |

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 section [“File Open Dialog and Menu” on page 629](#) 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 <code>MMEM:LOAD</code> commands. |
|----------------------|---|

Recall

| | |
|-------------------------|---|
| 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 |
| Readback | SA: Trace 1 Trace 2 Trace 3 Trace 4 Trace 5 Trace 6 VSA: Trace to Data 1 Trace to Data 2 Trace to Data 3 Trace to Data 4 Trace to Data 5 Trace to Data 6 |
| Instrument S/W Revision | Prior to A.02.00 |

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

- 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. |
| 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 |
| Readback | selected Trace table |
| Readback | SA: 1 2 3 4 5 6 VSA: Data 1 Data 2 Data 3 Data 4 Data 5 Data 6 |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|----------------------------|
| Key Path | Recall, Data, Trace |
| Mode | SA VSA |
| Instrument S/W Revision | Prior to A.02.00 |

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 | !Related command: MMEM:LOAD:TRAC:DATA D1,"TRC1.TXT",TXT !This command explicitly puts the data in the specified trace. |
|---------|--|

| | |
|----------|--|
| Key Path | Recall, Data (Import), Trace (to) |
| Mode | VSA |

Recall

Instrument S/W Revision Prior to A.02.00

Amplitude Correction

Pressing this key selects the Amplitude Corrections as the data type to be imported with this recall request. This key brings up the Amplitude Correction Menu that allows you to select which Amplitude Correction to recall.

A set of preloaded Corrections files can be found in the directory

/My Documents/ EMC Limits and Ampcor.

Under this directory, the directory called Ampcor (Legacy Naming) contains a set of legacy corrections files, generally the same files that were supplied with older Agilent EMI analyzers, that use the legacy suffixes .ant, .oth, .usr, and .cbl, and the old 8-character file names. In the directory called Ampcor, the same files can be found, with the same suffixes, but with longer, more descriptive filenames.

| | |
|-------------------------|--|
| Example | MMEM:LOAD:CORR 2,"MyCorrectionsData.csv" This loads the file of corrections data (on the default file directory path) into the specified correction table of date (2). |
| Dependencies/Couplings | Correction 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. When a correction is loaded from mass storage, it is automatically turned on. This also turns on the global "Apply Corrections" function. Only the first correction array (Correction 1) supports antenna units. Note that this means that a correction file with an Antenna Unit can only be loaded into the Corrections 1 register. Consequently only for Correction 1 does the dropdown in the Recall dialog include.ant, and if an attempt is made to load a correction file into any other Correction register which DOES contain an antenna unit, a Mass Storage error is generated. |
| Key Path | Recall, Data |
| Mode | SA EDGE GSM |
| Preset | 1 It is not part of Preset, but is reset by Restore Input/Output Defaults and survives subsequent running of the mode. |
| State Saved | Saved in instrument state. |
| Readback | 1 2 3 4 |
| Instrument S/W Revision | A.02.00 |

Amplitude Correction 1, 2, 3, 4 These menu key selections let you pick which Amplitude Correction to recall; either 1, 2, 3, or 4. The default is 1. Once selected, the key returns back to the Import Data menu and the selected Amplitude Correction number is annotated on the key. Now exactly what needs to be recalled has been selected. To trigger a recall of the selected Amplitude Correction, you must select the File Open key in the Import Data menu.

An example of using this menu is: if you select 4 and then continues on to the File Open menu, the amplitude correction table 4 will be recalled from the file selected or entered in File Name option in the File Open dialog. See “File Open Dialog and Menu” on page 629 for more details.

Antenna corrections are a particular kind of Amplitude Corrections – they are distinguished by having the Antenna Unit set to a value other than None. See the Input/Output chapter discussion of Amplitude Corrections for details on Antenna Units.

| | |
|-------------------------|---|
| Key Path | Recall, Data, Amplitude Correction |
| Mode | SA EDGE GSM |
| Readback | 1 |
| Instrument S/W Revision | A.02.00 |

| | |
|-------------------------|---|
| Key Path | Recall, Data, Amplitude Correction |
| Mode | SA EDGE GSM |
| Readback | 2 |
| Instrument S/W Revision | A.02.00 |

| | |
|-------------------------|---|
| Key Path | Recall, Data, Amplitude Correction |
| Mode | SA EDGE GSM |
| Readback | 3 |
| Instrument S/W Revision | A.02.00 |

| | |
|-------------------------|---|
| Key Path | Recall, Data, Amplitude Correction |
| Mode | SA EDGE GSM |
| Readback | 4 |
| Instrument S/W Revision | A.02.00 |

Limit Line

This key selects the Limit Lines as the data type to be imported with this recall request. It brings up the Limit Line Menu that lets you select which Limit Line to import the data into. This key is grayed out when SA measurements are running that do not support limit line importing.

A set of preloaded Corrections files can be found in the directory

/My Documents/ EMC Limits and Ampcor.

Under this directory, the directory called Limits (Legacy Naming) contains a set of legacy limits, generally the same files that were supplied with older Agilent EMI analyzers, that use the legacy suffix .lim, and the old 8-character file names. In the directory called Limits, the same files can be found, with

Recall

the same suffix, but with longer, more descriptive filenames.

| | |
|-------------------------|--|
| Example | MMEM:LOAD:LIM LLINE1,"MyLimitsFile.csv" This loads the limit line file data (on the default file directory path) into the specified limit line. |
| Dependencies/Couplings | Some Measurements do not allow the use of limit lines, so the key will be grayed out. The key will not show if no measurements in the Mode support it. When a limit line is loaded from mass storage, it is automatically turned on. This allows you to see it, thus confirming the load. |
| Key Path | Recall, Data |
| Mode | SA |
| Preset | 1; not part of Preset, but is reset by Restore Mode Defaults and survives power cycles |
| State Saved | Saved in State |
| Readback | selected Limit Line |
| Readback | 1 2 3 4 5 6 |
| Instrument S/W Revision | A.02.00 |

Limit Line 1, 2, 3, 4, 5, 6 These keys let you pick which Limit Line to import the data into; either 1 or 2. The default is 1. Once selected, the key returns back to the Import Data menu and the selected Limit Line number is annotated on the key. Now you have selected exactly what needs to be imported. In order to trigger an import of the selected Limit Line, you must select the Open key in the Import Data menu.

An example of using this menu is: If you select 2 and continue to the File Open menu, the Limit Line 2 will be imported from the file selected or entered in File Name option in the File Open dialog.

| | |
|-------------------------|---------------------------------|
| Key Path | Recall, Data, Limit Line |
| Mode | SA |
| Instrument S/W Revision | A.02.00 |

Capture Buffer

Capture Buffer functionality is not available for all measurements. The captured data is raw data (unprocessed).

| | |
|------------------------|--|
| Example | MMEM:LOAD:CAPT "MyCaptureData.bin" This loads the file of capture data (on the default file directory path) into the instrument. |
| 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. |

| | |
|-------------------------|---------------------|
| Key Path | Recall, Data |
| Mode | WCDMA |
| Instrument S/W Revision | Prior to A.02.00 |

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 | MMEM:LOAD:ZMAP "MyZonemapFile.omf" This loads the file of zone map data (on the default file directory path) into the custom map. |
| 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. |

| | |
|-------------------------|---------------------|
| Key Path | Recall, Data |
| Mode | OFDMA WIMAX |
| Instrument S/W Revision | Prior to A.02.00 |

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" |
|---------|---------------------------------|

| | |
|----------|--|
| Key Path | Recall, Data (Import) |
| Mode | VSA |
| Notes | Available file types are: <ul style="list-style-type: none"> • 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) |

Recall

Instrument S/W Revision Prior to A.02.00

Open...

Pressing **File Open** brings up the File Open standard Windows dialog and the File Open key menu. When you navigate 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.

Restriction and Notes Brings up Open dialog for recalling a <mode specific> Save Type

Key Path **Recall, Data**

Instrument S/W Revision Prior to A.02.00

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.

Limit Line Import: The instrument cannot mix Limits domains (X Axis Unit must be Frequency or Time for both Limits). So when a Limits file is loaded, the analyzer will go to the Limits domain (X Axis Unit) of that file. If this changes the Limits domain from what it was before the file was loaded, all Limits data in both Limits sets will be erased before the data loads. There will be no warning if this occurs, so care should be taken to know the domain of the file you are loading.

When a Limit is loaded it will be turned ON. The Margin settings will match those when the limit was saved.

Amplitude Correction Import: When an amplitude correction data file is imported, the selected amplitude correction table is loaded with the data in the imported file. Also, the x axis interpolation value for that corrections table is recalled from the file and the correction table is interpolated across the entire span. Then the selected amplitude correction table is turned on (**Amplitude Correction ON** and **Amplitude Corrections Apply** set to Yes).

When the Amplitude Correction is an Antenna correction and the Antenna Unit in the file is not None, the Y Axis Unit setting will change to match that of the file.

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. |
| Mode | SA |
| Instrument S/W Revision | Prior to A.02.00 |
| 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 0.1600 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. |
| Key Path | Recall, Data (Import), Trace (to), Open . . . |
| Mode | VSA |
| Instrument S/W Revision | Prior to A.02.00 |
| Remote Command | :MMEMory:LOAD:CORRection 1 2 3 4, <filename> |
| Example | :MMEM:LOAD:CORR 2 "myAmpcor.csv" recalls the Amplitude Correction data from the file myAmpcor.csv on the default directory to the 2nd Amplitude Correction table, and turns on table 2. |
| Dependencies/Couplings | Amplitude Correction <number> is ON, Amplitude Corrections Apply is set to Yes, Amplitude Correction <number> interpolation is recalled from the file and the interpolation occurs for that table. |

Recall

Remote Command Notes Errors are generated if the specified file is empty or missing, or if there is a file type mismatch.

Mode SA|EDGE|GSM

Instrument S/W Revision Prior to A.02.00

Remote Command :MMEMory:LOAD:LIMit LLINE1|LLINE2,<filename>

Example :MMEM:LOAD:LIM LLINE2,"myLimitLine2.csv" imports the 2nd Limit Line from the file myLimitLine2.csv in the default path.

Remote Command Notes Errors are reported if the file is empty or missing, or if the file type does not match.

SCPI Status Bits/OPC Dependencies Sequential - aborts the current measurement

Key Path **Recall, Data, File Open**

Mode SA

Readback floppy icon in the settings bar

Instrument S/W Revision Prior to A.02.00

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>

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"

Key Path **Recall, Data, File Open**

Mode WCDMA

Instrument S/W Revision Prior to A.02.00

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.

Key Path **Recall, Data (Import), Recorded Data, Open . . .**

Mode VSA

Instrument S/W Revision Prior to A.02.00

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.

Key Path **Recall, Data, Zone map**

Mode WIMAXOFDMA

Instrument S/W Revision Prior to A.02.00

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

Recall

now you want to specify which file to open.

Instrument S/W Revision Prior to A.02.00

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: Prior to A.02.00

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.

Restriction and Notes Pressing this key navigates you to the files and folders list in the center of the dialog.

Key Path **Recall, <various>, Open...**

Instrument S/W Revision Prior to A.02.00

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.

Remote Command Notes No SCPI command directly controls the sorting.

Key Path **Recall, <various>, Open...**

Instrument S/W Revision Prior to A.02.00

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.

Restriction and Notes Files in File Open dialog are sorted immediately in the selected order

Key Path **Recall, <various>, Open..., Sort**

Instrument S/W Revision Prior to A.02.00

By Name 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 filename.

Restriction and Notes Files in File Open dialog are sorted immediately in the selected order

| | |
|-------------------------|---|
| Key Path | Recall, <various>, Open..., Sort |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|--|
| Restriction and Notes | Files in File Open dialog are sorted immediately in the selected order |
| Key Path | Recall, <various>, Open..., Sort |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|--|
| Restriction and Notes | Files in File Open dialog are sorted immediately in the selected order |
| Key Path | Recall, <various>, Open..., Sort |
| Instrument S/W Revision | Prior to A.02.00 |

Ascending This causes the display of the file list to be sorted, according to the sort criteria above, in Ascending order.

| | |
|-------------------------|--|
| Restriction and Notes | Files in File Open dialog are sorted immediately in the selected order |
| Key Path | Recall, <various>, Open..., Sort |
| Instrument S/W Revision | Prior to A.02.00 |

Descending This causes the display of the file list to be sorted, according to the sort criteria above, in Descending order.

| | |
|-------------------------|--|
| Restriction and Notes | Files in File Open dialog are sorted immediately in the selected order |
| Key Path | Recall, <various>, Open..., Sort |
| Instrument S/W Revision | Prior to A.02.00 |

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.

Recall

If you navigated here from importing a data file, the data types available will be dependent on the current measurement and the selection you made under “Import Data”. For example:

Amplitude Corrections: pull down menu shows

Amplitude Corrections (*.csv)
Legacy Cable Corrections (*.cbl)
Legacy User Corrections (*.amp)
Legacy Other Corrections (*.oth)
Legacy Antenna Corrections (*.ant)

Limit: pull down menu shows

Limit Data (*.csv)
Legacy Limit Data (*.lim)

Trace: pull down menu shows "Trace Data (*.csv)"

| | |
|-----------------------|--|
| Restriction and Notes | Pressing this key causes the pull down menu to list all possible file types available in this context. |
|-----------------------|--|

| | |
|----------|---|
| Key Path | Recall, <various>, Open... |
|----------|---|

| | |
|-------------------------|------------------|
| Instrument S/W Revision | Prior to A.02.00 |
|-------------------------|------------------|

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.

| | |
|-----------------------|--|
| 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. |
|-----------------------|--|

| | |
|----------|---|
| Key Path | Recall, <various>, Open... |
|----------|---|

| | |
|-------------------------|------------------|
| Instrument S/W Revision | Prior to A.02.00 |
|-------------------------|------------------|

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.

| | |
|-----------------------|--|
| Restriction and Notes | Pressing this key causes the Open dialog to go away and auto return. |
|-----------------------|--|

| | |
|----------|---|
| Key Path | Recall, <various>, Open... |
|----------|---|

| | |
|-------------------------|------------------|
| Instrument S/W Revision | Prior to A.02.00 |
|-------------------------|------------------|

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: | Prior to A.02.00 |
| 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 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: | Prior to A.02.00 |

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. |
| Key Path | Save |
| Mode | All |
| Instrument S/W Revision | Prior to A.02.00 |

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 641 . |
| Key Path | Save |
| Mode | All |
| Instrument S/W Revision | Prior to A.02.00 |

Save

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 |
| Key Path | Save, State |
| Mode | All |
| Readback | Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register. |
| Instrument S/W Revision | Prior to A.02.00 |
| Example | *SAV 2 |
| Key Path | Save, State |
| Mode | All |
| Readback | Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register. |
| Instrument S/W Revision | Prior to A.02.00 |
| Example | *SAV 3 |
| Key Path | Save, State |
| Mode | All |
| Readback | Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register. |
| Instrument S/W Revision | Prior to A.02.00 |
| Example | *SAV 4 |
| Key Path | Save, State |
| Mode | All |
| Readback | Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register. |
| Instrument S/W Revision | Prior to A.02.00 |

| | |
|-------------------------|---|
| Example | *SAV 5 |
| Key Path | Save, State |
| Mode | All |
| Readback | Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register. |
| Instrument S/W Revision | Prior to A.02.00 |

| | |
|-------------------------|---|
| Example | *SAV 6 |
| Key Path | Save, State |
| Mode | All |
| Readback | Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register. |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|--------------------|
| Key Path | Save, State |
| Mode | All |
| Instrument S/W Revision | Prior to A.02.00 |

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).

Save

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.

| | |
|-------------------------|--------------------|
| Key Path | Save, State |
| Mode | All |
| Instrument S/W Revision | Prior to A.02.00 |

Save Saves all of the State of the currently active mode plus the system level Input/Output 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. |

| | |
|-------------------------|--------------------------------|
| Key Path | Save, State, To File... |
| Mode | All |
| Instrument S/W Revision | Prior to A.02.00 |

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 641 . |
| Key Path | Save |
| Mode | SA |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|---|
| Key Path | Save, Trace |
| Mode | SA |
| Readback | Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register. |
| Instrument S/W Revision | Prior to A.02.00 |
| Key Path | Save, Trace |
| Mode | SA |
| Readback | Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register. |
| Instrument S/W Revision | Prior to A.02.00 |
| Key Path | Save, Trace |
| Mode | SA |

Save

| | |
|-------------------------|---|
| Readback | Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register. |
| Instrument S/W Revision | Prior to A.02.00 |
| Key Path | Save, Trace |
| Mode | SA |
| Readback | Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register. |
| Instrument S/W Revision | Prior to A.02.00 |
| Key Path | Save, Trace |
| Mode | SA |
| Readback | Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register. |
| Instrument S/W Revision | Prior to A.02.00 |

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 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.

| | |
|-------------------------|----------------------------|
| Key Path | Save, Trace + State |
| Mode | SA |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Key Path | Save, Trace (+State) |
| Mode | SA |
| Instrument S/W Revision | Prior to A.02.00 |

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 a 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> |
| Key Path | Save, Trace, Save As... |

Save

| | |
|-------------------------|------------------|
| Mode | SA |
| Instrument S/W Revision | Prior to A.02.00 |

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.

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 657](#) 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:STORe 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. |
| 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. |
| Readback | 1-of-N selection |
| Instrument S/W Revision | Prior to A.02.00 |

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 | MMEM:STOR:TRAC:DATA TRACE3,"MyTraceFile.csv" This stores the specified trace data in the file MyTraceFile.csv in the default directory. VSA Example: MMEM:STOR:TRAC:DATA TRACE1,"Trc1.txt",TXT,ON |
| 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. |
| 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 |
| Readback | selected Trace table |
| Readback | Swept SA: 1 2 3 4 5 6 ALL Analog Demod Mode: RF Spectrum Demod Demod Ave Demod Max Demod Min AF Spectrum Vector Signal Analyzer: Trace 1 Trace 2 with header Trace 2 Trace 2 with header Trace 3 Trace 3 with header Trace 4 Trace 4 with header Trace 5 Trace 5 with header Trace 6 Trace 6 with header |
| Instrument S/W Revision | Prior to A.02.00 |

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

Save

output to the file.

| | |
|-------------------------|----------------------------|
| Key Path | Save, Data, Trace |
| Mode | SA Analog Demod VSA |
| Preset | The first trace key shown. |
| Instrument S/W Revision | Prior to A.02.00 |

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. |
|---------|---|

| | |
|-------------------------|--------------------------|
| Key Path | Save, Data, Trace |
| Mode | VSA |
| Preset | On |
| Instrument S/W Revision | Prior to A.02.00 |

Measurement Results

Different types of results are available for each particular measurement. The results that 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 “Save” on page 648 |
| Dependencies/Couplings | The key will not show if no measurements in the Mode support it. |
| Key Path | Save, Data |
| Mode | SA ADEMOD BASIC(IQ Analyzer) CDMA2K GSMEDGE PNOISE WCDMA WIMAXOFDMA TDS CDMA |
| Instrument S/W Revision | Prior to A.02.00 |

Amplitude Correction

Pressing this key selects the **Amplitude Corrections** as the data type to be exported with this save request. This key brings up the Amplitude Correction Menu that allows you to select which **Amplitude**

Correction to save.

| | |
|--------------------------|---|
| Example: | MMEM:STOR:CORR 3,"MyCorrectionsFile.csv" |
| | This stores the specified corrections data (3) in the file MyCorrectionsFile.csv in the default directory. |
| Remote Command Notes: | See |
| Key Path: | Save, Data |
| Preset: | 1; Is not part of Preset, but is reset by Restore Input/Output Defaults and survives subsequent running of the mode |
| State Saved: | Saved in instrument state. |
| Readback: | 1 2 3 4 |
| Dependencies/Couplings: | The key will not show if no measurements in the Mode support it. |
| Instrument S/W Revision: | A.02.00 |

Amplitude Correction 1, 2, 3, 4 These menu key selections let you pick which Amplitude Correction to save; either 1, 2, 3, or 4. The default is **1**. Once selected, the key returns back to the **Export Data** menu and the selected Amplitude Correction number is annotated on the key. Now exactly what needs to be saved has been selected. In order to trigger a save of the selected **Amplitude Correction**, you must select the **Save As** key in the **Export Data** menu.

An example of using this menu is: if you select 4, the Amplitude Correction table 4 will be saved to the file selected or entered in File Name option in the Save As dialog. See [“Save As . . .” on page 657](#) for more details.

| | |
|-------------------------|---|
| Key Path | Save, Data, Amplitude Correction |
| Readback | 1 |
| Instrument S/W Revision | A.02.00 |

| | |
|-------------------------|---|
| Key Path | Save, Data, Amplitude Correction |
| Readback | 2 |
| Instrument S/W Revision | A.02.00 |

| | |
|-------------------------|---|
| Key Path | Save, Data, Amplitude Correction |
| Readback | 3 |
| Instrument S/W Revision | A.02.00 |

| | |
|-------------------------|---|
| Key Path | Save, Data, Amplitude Correction |
| Readback | 4 |
| Instrument S/W Revision | A.02.00 |

Save

Limit Line

Pressing this key selects the Limit Lines as the data type to be exported with this save request. This key brings up the Limit Line Menu that allows you to select which **Limit Line** to save. This key is grayed out when SA measurements are running that do not support limit line exporting.

| | |
|--------------------------|--|
| Example: | MMEM:STOR:LIM LLINE1,"MyLimitsFile.csv" This stores the specified limit line data in the file MyLimitsFile.csv in the default directory. |
| Remote Command Notes: | See |
| Dependencies/Couplings: | Some Measurements do not allow the use of limit lines, so the key will be grayed out. The key will not show if no measurements in the Mode support it. |
| Preset: | 1; not part of Preset, but is reset by Restore Mode Defaults and survives power cycles |
| State Saved: | Saved in State |
| Key Path: | Save, Data |
| Readback: | selected Limit Line |
| Readback: | 1 2 3 4 5 6 |
| Instrument S/W Revision: | A.02.00 |

Limit Line 1, 2, 3, 4, 5, 6 These keys let you pick which Limit Line to save. The default is **1**. Once selected, the key returns back to the **Export Data** menu and the selected Limit Line number is annotated on the key. Now you have selected exactly what needs to be saved. To trigger a save of the selected Limit Line, you must select the Save As key in the Export Data menu.

An example of using this menu is: If you select 2, the Limit Line 2 will be saved in the format described in Section Limit Line Data File to the file selected or entered in **File Name** option in the **Save As** dialog.

| | |
|-------------------------|-------------------------------|
| Key Path | Save, Data, Limit Line |
| Instrument S/W Revision | A.02.00 |

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 "Save" on page 648 |
| Dependencies/Couplings | The key will not show if no measurements in the Mode support it. |

| | |
|-------------------------|-------------------|
| Key Path | Save, Data |
| Mode | WCDMA |
| Instrument S/W Revision | Prior to A.02.00 |

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 "Save" on page 648 |
| Dependencies/Couplings | The key will not show if no measurements in the Mode support it. |
| Key Path | Save, Data |
| Mode | OFDMA WiMAX |
| Instrument S/W Revision | Prior to A.02.00 |

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. |
| Key Path | Save, Data (Export) |
| Mode | VSA |
| Instrument S/W Revision | Prior to A.02.00 |

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

Save

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:

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 <mode specific> Save Type |
| Key Path | Save, Data |
| Mode | All |
| Instrument S/W Revision | Prior to A.02.00 |

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.

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.

Key Path **Save, Data, Save As...**

Instrument S/W Revision Prior to A.02.00

Remote Command `:MMEMory:STORe:RESults <filename>`

Example `:MMEM:STOR:RES "myResults.csv"` saves the results from the current measurement to the file myResults.csv in the default path.

`:MMEM:STOR:RES`

`"MyDocuments\Basic\data\ComplexSpectrum\results\myResults.xml"` saves the results from the current measurement (Complex Spectrum) to the file myResults.xml in the default path for IQ Analyzer (Basic) Mode.

This command form is not supported for the Swept SA measurement; see below.

Mode SA|ADEMOD|BASIC(IQ Analyzer)|CDMA2K|GSMEDGE|
PNOISE|WCDMA|WIMAXOFDMA|
TDSCDMA

Instrument S/W Revision Prior to A.02.00

Remote Command `:MMEMory:STORe:RESults:MTABle|PTABle <filename>`

Example `:MMEM:STOR:RES:MTAB "myResults.csv"` saves the results from the current marker table to the file myResults.csv in the default path.

`:MMEM:STOR:RES:PTAB "myResults.csv"` saves the results from the current peak table to the file myResults.csv in the default path.

This command form is only supported for the Swept SA measurement; see above.

Dependencies/Couplings If a save of Marker Table results is requested and the Marker Table is not on, no file is saved an error is generated:

Mass Storage error; Mkr Table must be on to save Mkr Table as Meas Results

If a save of Peak Table results is requested and the Peak Table is not on, no file is saved an error is generated:

Mass Storage error; Pk Table must be on to save Pk Table as Meas Results

Mode SA

Save

| | |
|-------------------------|-------------------------|
| Preset | Peak Table |
| State Saved | Saved in State |
| Range | Peak Table Marker Table |
| Instrument S/W Revision | Prior to A.02.00 |

Remote Command :MMEMory:STORe:CORRection 1|2|3|4, <filename>

Example :MMEM:STOR:CORR 2 "myAmpcor.csv" saves just the 2nd Amplitude Correction table to the file myAmpcor.csv on the default path.

| | |
|-------------------------|---------|
| Mode | SA |
| Instrument S/W Revision | A.02.00 |

Remote Command :MMEMory:STORe:TRACe:DATA
TRACE1 | TRACE2 | TRACE3 | TRACE4 | TRACE5 | TRACE6 | ALL, <filename
>

Example :MMEM:STOR:TRAC:DATA TRACE2,"myTrace2.csv" exports the 2nd trace to the file myTrace2.csv in the default path.

Remote Command Notes Not all measurements have the ALL selection. Traces cannot be recalled from files that were saved using the ALL selection.

If the save is initiated via SCPI, and 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.

| | |
|-------------------------|------------------|
| Mode | SA Analog Demod |
| Instrument S/W Revision | Prior to A.02.00 |

| Trace Number | Analog Demod Mode: Trace Names |
|--------------|-----------------------------------|
| TRACE1 | RF Spectrum |
| TRACE2 | Demod |
| TRACE3 | Demod Ave |
| TRACE4 | Demod Max |
| TRACE5 | Demod Min |
| TRACE6 | AF Spectrum |

| | |
|-----------------------------------|---|
| Remote Command | <code>:MMEMory:STORe:TRACe:DATA TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6 , "<filename>" [, CSV TXT SDF [, OFF ON 0 1]]</code> |
| Example | <code>MMEM:STOR:TRAC:DATA TRACE1,"Trc1.txt",TXT,ON</code> |
| 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> |
| Mode | VSA |
| Instrument S/W Revision | Prior to A.02.00 |
| Remote Command | <code>:MMEMory:STORe:LIMit LLINE1 LLINE2 , <filename></code> |
| Example | <code>:MMEM:STOR:LIM LLINE2,"myLimitLine2.csv" saves the 2nd Limit Line to the file myLimitLine2.csv in the default path.</code> |
| Remote Command Notes | <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> |
| SCPI Status Bits/OPC Dependencies | Sequential - waits for previous measurement to complete |
| Key Path | Save, Data, To File, Save As |
| Mode | NFIGURE |
| Instrument S/W Revision | A.02.00 |
| Remote Command | <code>:MMEMory:STORe:CAPTured <filename></code> |

Save

| | |
|-------------------------|---|
| Example | <code>:MMEM:STOR:CAPT</code> "MyDocuments\WCDMA\data\captureBuffer\myCaptureBuffer.bin" saves the capture buffer data from the current measurement to the file myCaptureBuffer.bin in 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. |
| Key Path | Save, Data, Save As |
| Mode | WCDMA |
| Instrument S/W Revision | Prior to A.02.00 |
| Remote Command | <code>:MMEMory:STORe:ZMAP <filename></code> |
| Example | <code>:MMEM:STOR:ZMAP "myZoneMap.omf"</code> saves current Zone map as 89601 compatible file type. |
| Restriction and Notes | If a file with the same name already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk overwriting the file during a instrument software upgrade. Both single and double quotes are supported for any filename parameter over remote. Once a save is complete, the Export Data menu will appear, and the Save As dialog will disappear. The message "File <file name> saved" will appear after the save is complete. |
| Key Path | Save, Data, Zone map |
| Mode | WIMAXOFDMA |
| Instrument S/W Revision | Prior to A.02.00 |
| Remote Command | <code>:MMEMory:STORe:RECOding</code> <code><filename>[,SDF SDFX CSV TXT MAT4 MAT HDF5 BIN[,OFF ON 0 1[,OFF ON 0 1[,OFF ON 0 1]]]]</code> |
| Example | <code>MMEM:STOR:REC "MyRecording.sdf",SDF,ON,ON,OFF</code> |

| | |
|-------------------------|---|
| Remote Command Notes | Recorded data must be available in the buffer. 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. The three optional Booleans determine if: <ol style="list-style-type: none"> 1. file is saved with headers 2. data is resampled to the current span before saving 3. player position settings limit the data saved |
| Mode | VSA |
| Instrument S/W Revision | Prior to A.02.00 |

Screen Image

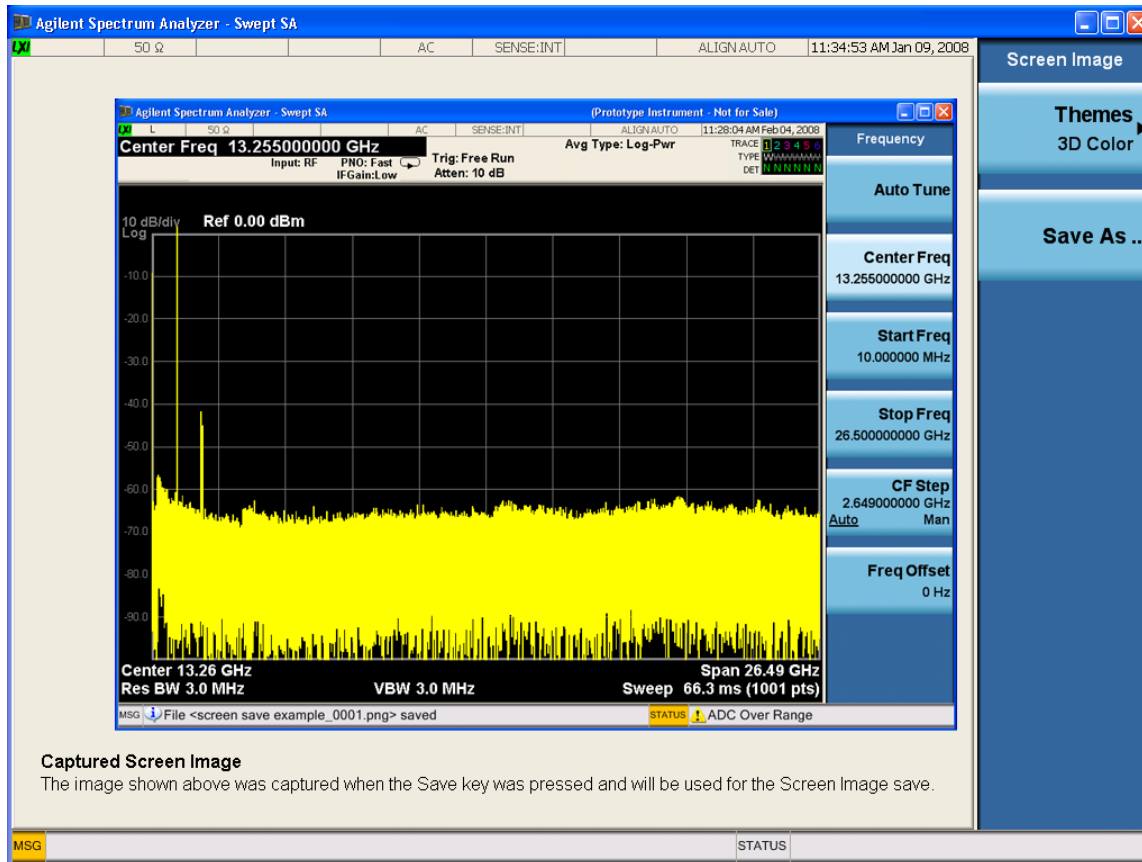
Accesses a menu of functions that enable you to specify a format and location for the saved screen image.

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 ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:

Save



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.

NOTE

For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu 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

Key Path

Save

Mode

All

Instrument S/W Revision Prior to A.02.00

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.

| | |
|-------------------------|--|
| Remote Command | :MMEMory:STORe:SCReem:THEMe TDCoLor TDMonochrome FCoLoR FMONochrome :MMEMory:STORe:SCReem:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Key Path | Save, Screen Image |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Instrument S/W Revision | Prior to A.02.00 |

3D Color Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|-------------------------|-----------------------------------|
| Example | MMEM:STOR:SCR:THEM TDC |
| Key Path | Save, Screen Image, Themes |
| Readback | 3D Color |
| Instrument S/W Revision | Prior to A.02.00 |

3D Monochrome Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|-------------------------|-----------------------------------|
| Example | MMEM:STOR:SCR:THEM TDM |
| Key Path | Save, Screen Image, Themes |
| Readback | 3D Mono |
| Instrument S/W Revision | Prior to A.02.00 |

Flat Color Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------|-----------------------------------|
| Example | MMEM:STOR:SCR:THEM FCOL |
| Key Path | Save, Screen Image, Themes |
| Readback | Flat Color |

Save

Instrument S/W Revision Prior to A.02.00

Flat Monochrome Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Example MMEM:STOR:SCR:THEM FMON

Key Path **Save, Screen Image, Themes**

Readback Flat Mono

Instrument S/W Revision Prior to A.02.00

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 enter this dialog.

Restriction and Notes Brings up Save As dialog for saving a Screen Image Save Type

Key Path **Save, Screen Image**

Instrument S/W Revision Prior to A.02.00

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: Prior to A.02.00

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 Prior to A.02.00

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: Prior to A.02.00

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.

Restriction and Notes Pressing this key navigates you to the files and folders list in the center of the dialog.

Save

| | |
|-------------------------|--|
| Key Path | Save, <various>, Save As... |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|--|
| Restriction and Notes | Brings up the Alpha Editor. Editor created file name is loaded in the File name field of the Save As dialog. |
| Key Path | Save, <various>, Save As... |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|---|
| 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. |
| Key Path | Save, <various>, Save As... |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|---|
| 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 |
| Key Path | Save, <various>, Save As... |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|---|
| Restriction and Notes | Creates a new folder in the current folder and lets you fill in the folder name using the Alpha Editor. |
| Key Path | Save, <various>, Save As... |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|---|
| Restriction and Notes | Pressing this key causes the Save As dialog to go away and auto return. |
| Key Path | Save, <various>, Save As... |
| Instrument S/W Revision | Prior to A.02.00 |

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: | Prior to A.02.00 |

Single (Single Measurement/Sweep)

Source

This mode does not have any Source control functionality.

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

Source

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.

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

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. |
| 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: | Prior to A.02.00 |

Sweep / Control

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: Prior to A.02.00

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: Prior to A.02.00

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**
Readback The state and method of Gate, as [Off, LO] or [On, Video]. Note that for measurements that only support gated LO, the method is nonetheless read back, but always as LO.
Instrument S/W Revision Prior to A.02.00

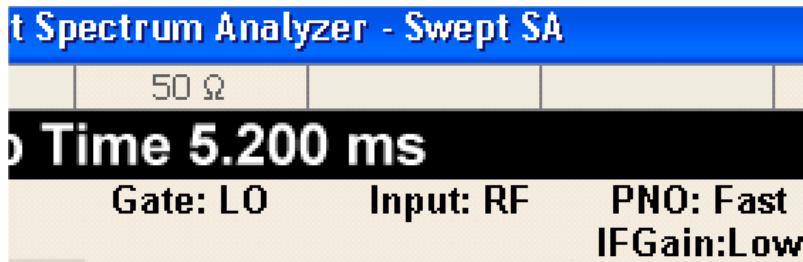
Gate On/Off

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? |
| 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: | Prior to A.02.00 |

Gate View On/Off

Turning on Gate View in the Swept SA measurement provides a single-window gate view display.

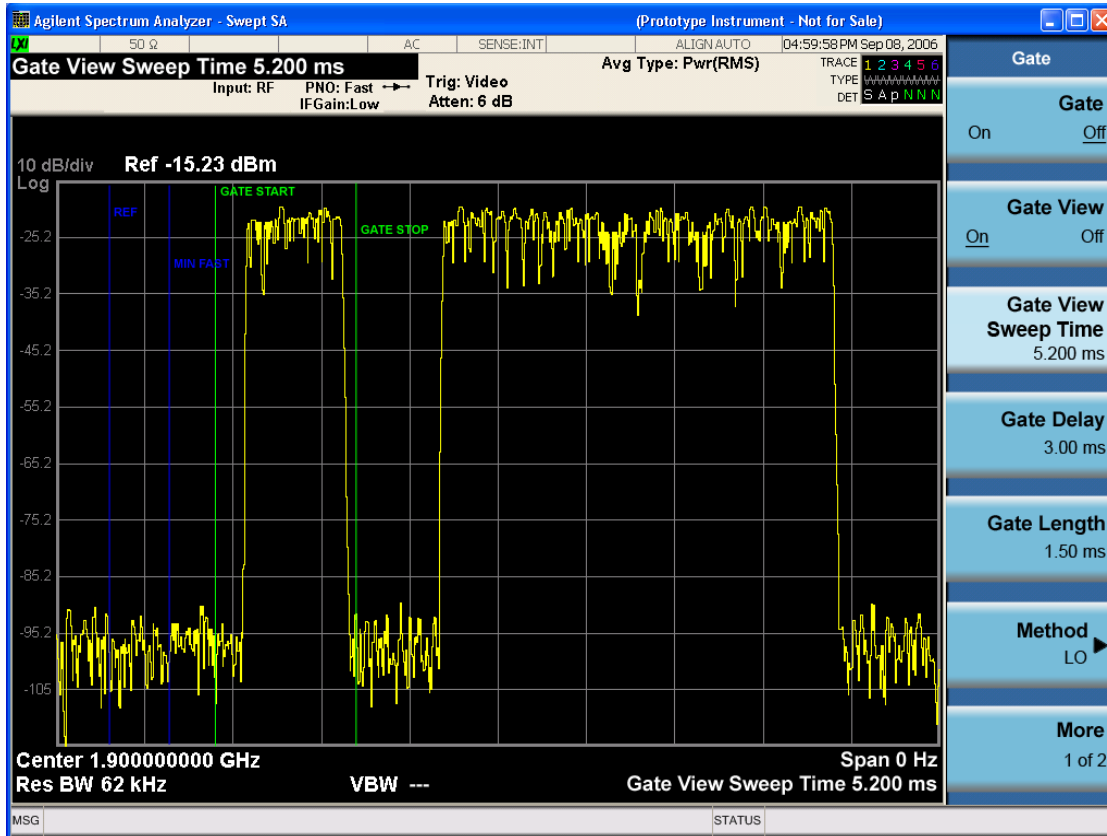
Turning on Gate View in other measurements shows the split-screen Gate View. In these measurements, when the Gate View is on, the regular view of the current measurement traces and results are reduced vertically to about 70% of the regular height. The Zero Span window showing the positions of the Gate

Sweep / Control

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.

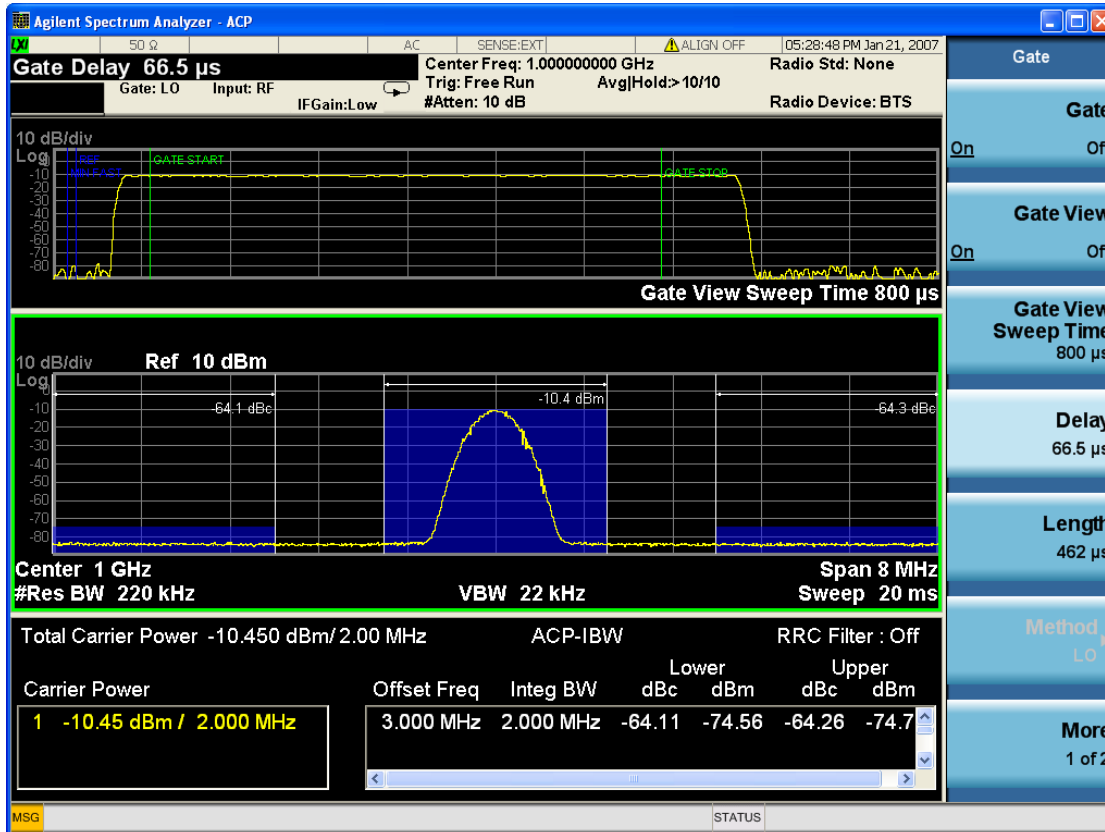
| | |
|-------------------------|--|
| Remote Command | <code>[:SENSe] :SWEep:EGATe:VIEW ON OFF 1 0</code> <code>[:SENSe] :SWEep:EGATe:VIEW?</code> |
| Example | SWE:EGAT:VIEW ON turns on the gate view. |
| Dependencies/Couplings | <p>These couplings apply to the Swept SA measurement:</p> <ul style="list-style-type: none">• 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 press 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). <p>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 671.</p> <ul style="list-style-type: none">• 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. <p>In the Swept SA measurement:</p> <p>In Gate View, the regular Sweep Time key is grayed out, to avoid confusing you when you want to set Gate View Sweep Time.</p> <p>In the other measurements:</p> <p>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.</p> <ul style="list-style-type: none">• When you turn Gate View on, the upper window Sweep Time is set to the gate view sweep time. |
| Key Path | Sweep/Control, Gate |
| Preset | OFF |
| State Saved | Saved in state |
| Range | On Off |
| Instrument S/W Revision | Prior to A.02.00 |

A sample of the Gate View screen in the Swept SA measurement is shown below:



A sample of the Gate View screen in other measurements is shown below. This example is for the ACP measurement:

Sweep / Control



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.

- 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

Sweep / Control

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 $t = t_{min} + GateDelay + GateLength$.

Preset: 519.3 μ s
WiMAX OFDMA: 5 ms
GSM/EDGE: 1 ms

State Saved: Saved in state

Min: 1 μ s

Max: 6000 s

Key Path: **Sweep/Control, Gate**

Instrument S/W Revision: Prior to A.02.00

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?

| | |
|--------------------------|--|
| 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: | Prior to A.02.00 |

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. |

| |
|--|
| <p>Gate Length (=1.83/RBW) 2.8 ms</p> |
|--|

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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 |

Sweep / Control

Instrument S/W Revision: Prior to A.02.00

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: Prior to A.02.00

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**

Readback: LO

Instrument S/W Revision: Prior to A.02.00

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 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 |
| Readback: | Video |
| Instrument S/W Revision: | Prior to A.02.00 |

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 |
| Readback: | FFT |
| Instrument S/W Revision: | Prior to A.02.00 |

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

Sweep / Control

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: | Prior to A.02.00 |

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.

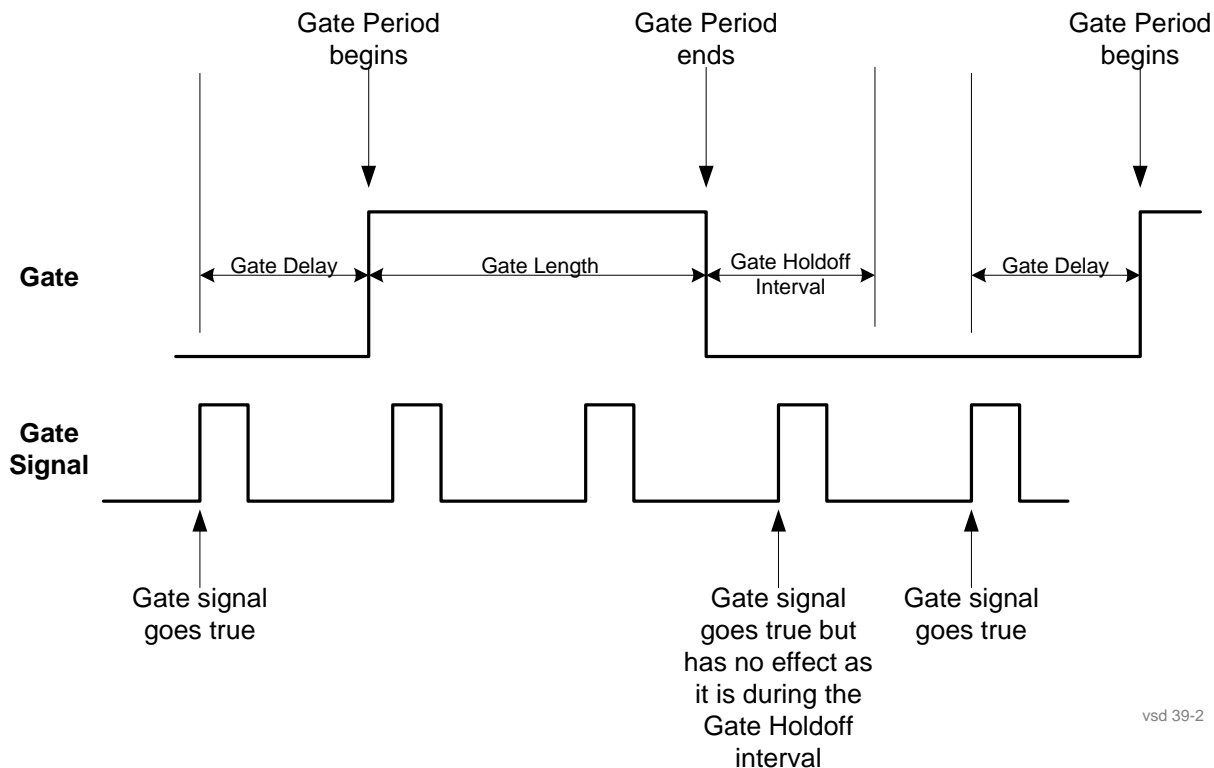
| | |
|--------------------------|---|
| Remote Command: | <code>[:SENSE] :SWEep:EGATe:CONTRol EDGE LEVEl [:SENSE] :SWEep:EGATe:CONTRol?</code> |
| Example: | SWE:EGAT:CONT EDGE |
| Dependencies/Couplings: | If the Gate Method is FFT the Control key is grayed out and Edge is selected. If the Gate Source 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: | Prior to A.02.00 |

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,

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:



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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 the manually set holdoff is returned to a query.

Remote Command

```
[ :SENSe ] :SWEep:EGATe:HOLDoff <time>
[ :SENSe ] :SWEep:EGATe:HOLDoff?
[ :SENSe ] :SWEep:EGATe:HOLDoff:AUTO OFF|ON|0|1
[ :SENSe ] :SWEep:EGATe:HOLDoff:AUTO?
```

Sweep / Control

| | |
|-------------------------|---|
| 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> |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |

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**.

See “More Information” on page 679

| | |
|--------------------------|---|
| Remote Command: | [:SENSe] :SWEep :EGATe :DELay :COMPensation :TYPE OFF SETTled GDELay [:SENSe] :SWEep :EGATe :DELay :COMPensation :TYPE? |
| Example: | SWE:EGAT:DEL:COMP:TYPE SETT SWE:EGAT:DEL:COMP:TYPE? |
| Scope: | Meas Global |
| Range: | Uncompensated Delay Until RBW Settled Compensate for RBW Group Delay |
| Readback text: | Uncompensated Settled 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. This is a non-forceful grayout, so 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: | Prior to A.02.00 |

More Information

Selecting **Uncompensated** means that the actual gate delay is as you set it.

Selecting **Delay Until RBW Settled** causes the gate delay to be increased above the user 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 (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.

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

Sweep / Control

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 the user 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 667. 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] :SWEep:EGATe:MINFast?

Example: SWE:EGAT:MIN?

Instrument S/W Revision: Prior to A.02.00

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 683](#)

See [“RF Trigger Source” on page 685](#)

See [“I/Q Trigger Source” on page 686](#)

See [“More Information” on page 687](#)

Remote Command

```
:TRIGger:<measurement>[:SEQuence]:SOURce
EXTErnal1|EXTErnal2|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 685 and “I/Q Trigger Source” on page 686 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> |
| SCPI Status Bits/OPC Dependencies | <p>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.</p> |
| Key Path | Front-panel key |
| Preset | See table below |
| Instrument S/W Revision | Prior to A.02.00 |

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 TriggerSource 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 | |

Trigger

| Meas | Mode | Preset for RF | Preset for IQ | Notes |
|----------|---|--|--|--|
| 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, 1xE V-DO, DVB-T/H | IMM | IQ not supported | |
| SEM | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB | SA, WCDMA, C2K, TD-SCDMA, WIMAX OFDMA: IMMediate 1xEVDO(BTS): EXTernal1 | IQ not supported | |
| CDP | WCDMA | IMM | IMM | |
| RHO | WCDMA | IMM | IMM | |
| PCON | WCDMA | IMM | IMM | |
| QPSK | WCDMA, C2K, 1xEVDO | All except CDMA 1xEVDO: IMMediate CDMA 1xEVDO: EXT1 | IMM | |
| MON | All except SA and BASIC | IMM | IQ not supported | |
| WAV | | All except GSM/EDGE: IMMediate GSM/EDGE: RFBurst | All except GSM/EDGE: IMMediate GSM/EDGE: IQMag | |
| PVT | WIMAX OFDMA | RFB | IMM | |
| EVM | WIMAX OFDMA, DVB-T/H, DTMB | IMM | IMM | |

| Meas | Mode | Preset for RF | Preset for IQ | Notes |
|-----------------|--------------------|---------------|------------------|-------|
| 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 | |
| Combined WCDMA | WCDMA | IMM | IQ not supported | |
| Combined 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
EXTernal1|EXTernal2|IMMEDIATE|LINE|FRAME|RFBurst|VIDeo|
IF|ALARM|LAN
:TRIGger:<measurement>[:SEquence]:RF:SOURce?
```

Trigger

| | |
|------------------------------------|--|
| Example: | <p>TRIG:ACP:RF:SOUR EXT1</p> <p>Selects the external 1 trigger input for the ACP measurement and the RF input</p> <p>TRIG:RF:SOUR VID</p> <p>Selects video triggering for the SANalyzer measurement and the RF input. For SAN, do not use the <measurement> keyword.</p> |
| 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. For the RF Trigger Source, the following trigger sources are available:</p> <ul style="list-style-type: none">— 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 <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> |
| SCPI Status Bits/OPC Dependencies: | <p>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.</p> |
| Instrument S/W Revision: | Prior to A.02.00 |

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|IINPut
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: Prior to A.02.00

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

Trigger

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 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.

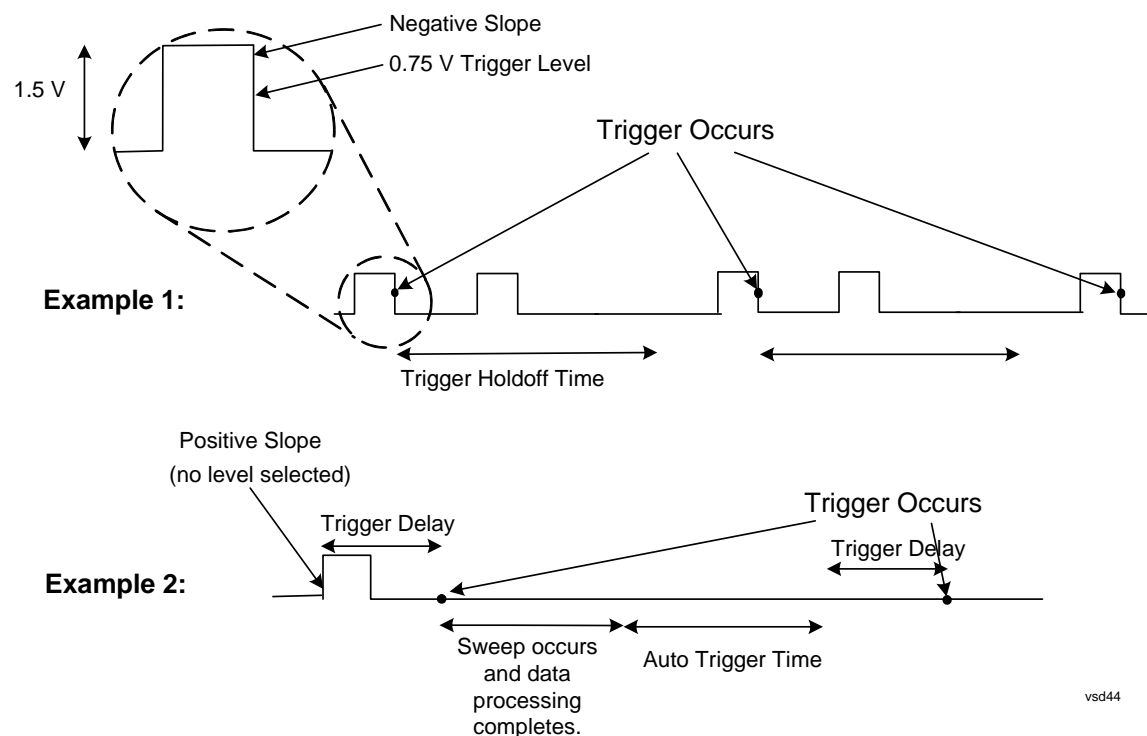
The settings setup menu can be accessed by pressing the key for the current trigger source a second time. For example, one press of Video selects the Video trigger as the source. The Video key becomes highlighted and the hollow arrow on the key turns black. Now a second press of the key takes you into 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: | 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: | Prior to A.02.00 |

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.

NOTE 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: | Trigger |
| Notes: | Log Plot and Spot Frequency measurements do not support Video Trigger |

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: Prior to A.02.00

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 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: **Trigger, Video**

Default Unit: depends on the current selected Y axis unit

Instrument S/W Revision: Prior to A.02.00

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: | Trigger, Video |
| Instrument S/W Revision: | Prior to A.02.00 |

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: | Trigger, Video |
| Default Unit: | s |
| Instrument S/W Revision: | Prior to A.02.00 |

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.

Trigger

Key Path: **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: Prior to A.02.00

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]:LINE:SLOPe POSitive|NEGative`
`:TRIGger[:SEquence]:LINE:SLOPe?`

Example: `TRIG:LINE:SLOP NEG`

Preset: `POSitive`

State Saved: Saved in instrument state.

Key Path: **Trigger, Line**

Instrument S/W Revision: Prior to A.02.00

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]:LINE:DELay <time>`
`:TRIGger[:SEquence]:LINE:DELay?`
`:TRIGger[:SEquence]:LINE:DELay:STATe OFF|ON|0|1`
`:TRIGger[:SEquence]:LINE:DELay:STATe?`

Example: `TRIG:LINE:DEL:STAT ON`

`TRIG:LINE:DEL 100 ms`

Preset: `Off, 1.000 us`

State Saved: Saved in instrument state.

Min: `-150 ms`

Max: `500 ms`

| | |
|--------------------------|----------------------|
| Key Path: | Trigger, Line |
| Default Unit: | S |
| Instrument S/W Revision: | Prior to A.02.00 |

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: | 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: | Prior to A.02.00 |
|--------------------------|------------------|

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 |

Trigger

Key Path: **Trigger, External 1**
Default Unit: V
Instrument S/W Revision: Prior to A.02.00

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]: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: **Trigger, External 1**

Instrument S/W Revision: Prior to A.02.00

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: **Trigger, External 1**

Default Unit: s

Instrument S/W Revision: Prior to A.02.00

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: | 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: Prior to A.02.00

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: | Trigger, External 2 |
| Default Unit: | V |

Trigger

Instrument S/W Revision: Prior to A.02.00

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]: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: **Trigger, External 2**

Instrument S/W Revision: Prior to A.02.00

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: **Trigger, External 2**

Default Unit: s

Instrument S/W Revision: Prior to A.02.00

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: | Trigger | |
| 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: | Prior to A.02.00 | |

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: **Trigger, RF Burst**

Default Unit: Absolute: depends on the current selected Y-Axis unit
 Relative: dB or dBc

Instrument S/W Revision: Prior to A.02.00

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: | Trigger, RF Burst |
| Instrument S/W Revision: | Prior to A.02.00 |

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: | Trigger, RF Burst |
| Default Unit: | s |
| Instrument S/W Revision: | Prior to A.02.00 |

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: | Trigger |
| Readback: | [Sync: <value of Sync Source>], for example, [Sync: External 1] |
| 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: Prior to A.02.00

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.

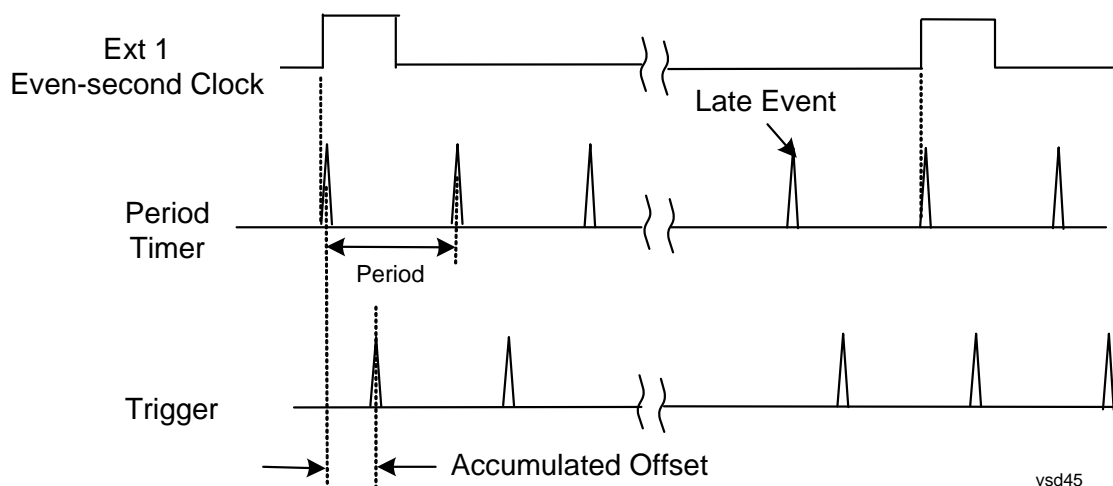
A common application is measuring periodic burst RF signals for which a trigger signal is not easily available. For example, we might be measuring a TDMA radio which bursts every 20 ms. Let's assume that the 20 ms period is very consistent. Let's also assume that we do not have an external trigger source 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: **Trigger, Periodic Timer**

Default Unit: S

Instrument S/W Revision: Prior to A.02.00

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 knob or the SCPI adjust command, serves to delay the timing of the trigger event.

| | |
|--------------------------|--|
| Remote Command: | <code>:TRIGger[:SEquence]:FRAMe:OFFSet <time></code> <code>:TRIGger[:SEquence]:FRAMe:OFFSet?</code> |
| 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: | Trigger, Periodic Timer |
| Default Unit: | S |
| Instrument S/W Revision: | Prior to A.02.00 |

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: | <code>:TRIGger[:SEquence]:FRAMe:ADJust <time></code> |
| 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: | Prior to A.02.00 |

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: | Trigger, Periodic Timer |
| Instrument S/W Revision: | Prior to A.02.00 |

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

Trigger

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: **Trigger, Periodic Timer**

Readback: The current setting is read back to this key and it is also Readback to the previous **Periodic Timer** trigger key.

Instrument S/W Revision: Prior to A.02.00

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: **Trigger, Periodic Timer, Sync Source**

Readback: Off

Instrument S/W Revision: Prior to A.02.00

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: **Trigger, Periodic Timer, Sync Source**

Readback: External 1

Instrument S/W Revision: Prior to A.02.00

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: **Trigger, Periodic Timer, Sync Source**
 Readback: External 2
 Instrument S/W Revision: Prior to A.02.00

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: **Trigger, Periodic Timer, Sync Source**
 Readback: RF Burst
 Instrument S/W Revision: Prior to A.02.00

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: **Trigger, Periodic Timer**
 Default Unit: s
 Instrument S/W Revision: Prior to A.02.00

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

Trigger

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 |
| Max: | +500 ms |
| Key Path: | Trigger, Periodic Timer |
| Default Unit: | s |
| Instrument S/W Revision: | Prior to A.02.00 |

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.

| | |
|-------------|---|
| NOTE | 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 | Trigger |
| Mode | SA, IQ(Basic) |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Readback | The LXI trigger source that becomes active when this key is selected is displayed. The possible values are "LAN Event" and "Alarm" |
| Instrument S/W Revision | Prior to A.02.00 |

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 706). Pressing this key when it is already selected accesses the LAN trigger

setup menu.

NOTE 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. |
| Key Path | Trigger, LXI Trigger |
| Mode | SA, IQ(Basic) |
| Preset | ON |
| State Saved | Saved in instrument state. |
| State Saved | Saved in instrument state. |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Key Path | Trigger LXI Trigger, LAN Event |
| Mode | SA, IQ(Basic) |
| Instrument S/W Revision | Prior to A.02.00 |

LAN Event List After selecting LAN as the trigger source, you are 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" |

Trigger

| | |
|-------------------------|---|
| Key Path | Trigger LXI Trigger, LAN Event |
| Mode | SA, IQ(Basic) |
| Preset | "LAN0", "LAN1", "LAN2", "LAN3", "LAN4", "LAN5", "LAN6", "LAN7" |
| State Saved | Saved in instrument state. |
| Readback | Displays the value of the LXI Trigger LAN Event parameter (Enabled Disabled). |
| Instrument S/W Revision | Prior to A.02.00 |

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 | <code>:TRIGger[:SEQuence]:LXI:LAN[:SET]:DETection "LANEVENT", HIGH LOW RISE FALL</code> |
| Example | <code>:TRIG:LXI:LAN:DET "LAN0",HIGH</code> |
| Restriction and Notes | If a non existent LAN event is passed in the lanEvent argument, the command is ignored |
| Key Path | Trigger LXI Trigger, LAN Event, <lanEvent> |
| Mode | SA, IQ(Basic) |
| Preset | HIGH |
| State Saved | Saved in instrument state. |
| Range | HIGH LOW RISE FALL |
| Readback | Currently selected detection type |
| Instrument S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Remote Command | <code>:TRIGger[:SEQuence]:LXI:LAN[:SET]:DETection? "LANEVENT"</code> |
| Example | <code>:TRIG:LXI:LAN:DET? "LAN0"?</code> |
| Restriction and Notes | If a non existent LAN event is passed in the lanEvent argument, the command is ignored |
| Key Path | Trigger LXI Trigger, LAN Event, <lanEvent> |
| Mode | SA, IQ(Basic) |
| Preset | HIGH |

| | |
|-------------------------|-----------------------------------|
| State Saved | Saved in instrument state. |
| Range | HIGH LOW RISE FALL |
| Readback | Currently selected detection type |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Key Path | Trigger, 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) |
| Instrument S/W Revision | Prior to A.02.00 |

| | |
|-------------------------|--|
| Remote Command | :TRIGger[:SEQuence]:LXI:LAN[:SET]:DELay? "lanEvent " |
| Example | :TRIG:LXI:LAN:DEL? "LAN0" |
| Key Path | Trigger, 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) |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Key Path | Trigger, LXI Trigger, LAN Event, <lanEvent> |

Trigger

| | |
|-------------------------|----------------------------|
| Mode | SA, IQ(Basic) |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | OFF ON 0 1 |
| Instrument S/W Revision | Prior to A.02.00 |

Remote Command :TRIGger [:SEquence] :LXI :LAN [:SET] :ENABled? "LANEVENT"

Example :TRIG:LXI:LAN:ENAB? "LAN0"

Key Path **Trigger, LXI Trigger, LAN Event, <lanEvent>**

| | |
|-------------------------|----------------------------|
| Mode | SA, IQ(Basic) |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | OFF ON 0 1 |
| Instrument S/W Revision | Prior to A.02.00 |

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 reflect the new number of key panels in the LAN source menu.

Remote Command :TRIGger [:SEquence] :LXI :LAN :ADD "LANEVENT"

Example :TRIG:LXI:LAN:ADD "LANEVENT"

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.

| | |
|-------------------------|---|
| Mode | SA, IQ(Basic) |
| State Saved | No |
| Range | Uppercase, Lowercase, Numeric, Symbol except for comma or semicolon |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|--|
| Remote Command | :TRIGger [:SEquence] :LXI :LAN :REMove [:EVENT] "LANEVENT" |
| Example | :TRIG:LXI:LAN:REM "LANEVENT" |
| 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. |
| Mode | SA, IQ(Basic) |
| State Saved | No |
| Range | Uppercase, Lowercase, Numeric, Symbol except for comma or semicolon |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|---|
| 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. |
| Mode | SA, IQ(Basic) |
| Instrument S/W Revision | Prior to A.02.00 |

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:

Trigger

"192.168.0.1:23"

"agilent.com, soco.agilent.com"

"agilent.com:80, 192.168.0.1"

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?

Restriction and Notes The maximum length of the string is 45 characters. Nothing happens if the LAN event does not exist.

Mode SA, IQ(Basic)

Preset "" (empty string)

State Saved Saved in instrument state.

Range Uppercase, Lowercase, Numeric, Symbol

Instrument S/W Revision Prior to A.02.00

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

Remote Command :TRIGger[:SEquence]:LXI:LAN:COUNT?

Example :TRIG:LXI:LAN:COUN?

Mode SA, IQ(Basic)

Instrument S/W Revision Prior to A.02.00

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.

Remote Command :TRIGger[:SEquence]:LXI:LAN[:SET]:IDENtifier
"LANEVENT", "identifier"
:TRIGger[:SEquence]:LXI:LAN[:SET]:IDENtifier?
"LANEVENT"

Example :TRIG:LXI:LAN:IDEN "LAN0","debugstring"

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.

Mode SA, IQ(Basic)

State Saved Saved in instrument state.

| | |
|-------------------------|---------------------------------------|
| Range | Uppercase, Lowercase, Numeric, Symbol |
| Instrument S/W Revision | Prior to A.02.00 |

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

| | |
|-------------------------|--|
| 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" |
| Mode | SA, IQ(Basic) |
| Instrument S/W Revision | Prior to A.02.00 |

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 706). Pressing this key when it is already selected accesses the alarm source selection menu.

| | |
|-----------------------------------|--|
| Example | TRIG:ACP:SOUR ALAR |
| 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. |
| Key Path | Trigger LXI Trigger |
| Mode | SA, IQ(Basic) |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Key Path | Trigger, LXI Trigger, Alarm |
| Mode | SA, IQ(Basic) |
| Instrument S/W Revision | Prior to A.02.00 |

Trigger

Alarm List After selecting Alarm as the trigger source, you are presented with a list of possible alarms. Pressing an alarm (e.g. "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" |
| Key Path | Trigger, LXI Trigger, Alarm |
| Mode | SA, IQ(Basic) |
| Preset | "ALARM0" |
| State Saved | Saved in instrument state. |
| Readback | Displays the value of the LXI Trigger Alarm Enabled parameter (Enabled Disabled). |
| Instrument S/W Revision | Prior to A.02.00 |

Date/Time Absolute alarm time sets an alarm for one specific time using the date and time of day (e.g. 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 717](#).

The date and time the alarm is scheduled to go off is noted on the branch key.

NOTE 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.

| | |
|-------------------------|---|
| Key Path | Trigger, LXI Trigger, Alarm, <alarmEvent> |
| Mode | SA, IQ(Basic) |
| Readback | Annotated with the date and time the alarm is scheduled to go off. |
| Instrument S/W Revision | Prior to A.02.00 |
| 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 | <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> |
| Key Path | Trigger, 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. |
| Instrument S/W Revision | Prior to A.02.00 |
| Remote Command | <code>:TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue]:ABSolute? "alarmEvent"</code> |
| Example | <p><code>:TRIG:LXI:ALAR:TIME:ABS? "ALARM0"</code></p> <p>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)".</p> |
| 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> |
| Key Path | Trigger, LXI Trigger, Alarm, <alarmEvent>,Time |
| Mode | SA, IQ(Basic) |

Trigger

| | |
|-------------------------|---|
| Preset | Current date at initialization at 00:00:00.000000 |
| State Saved | Saved in instrument state. |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|---|
| Key Path | Trigger, 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. |
| Instrument S/W Revision | Prior to A.02.00 |

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 "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. |
|-----------------------|--|

| | |
|-------------------------|---|
| Key Path | Trigger, 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 |
| Instrument S/W Revision | Prior to A.02.00 |

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 717](#)), 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 synchrony.

| | |
|-------------------------|---|
| Restriction and Notes | Alarm times are settable to microsecond resolution. |
| Key Path | Trigger, LXI Trigger, Alarm, <alarmEvent>,Time |
| Mode | SA, IQ(Basic) |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|---|
| Remote Command | :TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue] "alarmEvent", <seconds>, <fractionalSeconds> |
| Example | :TRIG:LXI:ALAR:TIME "ALARM0",123456.0 S, 0.123456 |
| Restriction and Notes | Values representing a time in the past result in an error. |
| Mode | SA, IQ(Basic) |
| 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) FractionalSeconds: 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 FractionalSeconds: 0.0 – 0.999999 |
| Instrument S/W Revision | Prior to A.02.00 |

| | |
|-------------------------|---|
| Remote Command | :TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue]? |
| Example | :TRIG:LXI:ALAR:TIME? |
| Restriction and Notes | Values representing a time in the past result in an error. |
| Mode | SA, IQ(Basic) |
| 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) FractionalSeconds: 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 FractionalSeconds: 0.0 – 0.999999 |
| Instrument S/W Revision | Prior to A.02.00 |

Epoch Time Seconds (Remote only) Sets the seconds portion of the LXI Alarm time. This represents the number

Trigger

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.

| | |
|-------------------------|--|
| Remote Command | :TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME:SEConds "alarmEvent", <seconds> |
| Example | :TRIG:LXI:ALAR:TIME:SEC "ALARM0",123456.0 S |
| Restriction and Notes | Values representing a time in the past result in an error. Values containing a decimal portion result in an error. |
| Mode | SA, IQ(Basic) |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |

| | |
|-------------------------|--|
| Remote Command | :TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME:SEConds? "alarmEvent " |
| Example | :TRIG:LXI:ALAR:TIME:SEC "ALARM0"? |
| Restriction and Notes | Values representing a time in the past result in an error. Values containing a decimal portion result in an error. |
| Mode | SA, IQ(Basic) |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |

Epoch Time Fraction (Remote Only) Sets the sub-second value of the Epoch time.

| | |
|-----------------------|---|
| Remote Command | :TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue]:FRACti on "alarmEvent", <fractionalSeconds> |
| Example | :TRIG:LXI:ALAR:TIME:FRAC "ALARM0",0.123456 S |
| Restriction and Notes | Values representing a time in the past result in an error. |
| Mode | SA, IQ(Basic) |
| Preset | 0 |

State Saved Saved in instrument state.

Range 0.0 – 0.999999

Instrument S/W Revision Prior to A.02.00

Remote Command :TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue]:FRACtion? "alarmEvent"

Example :TRIG:LXI:ALAR:TIME:FRAC "ALARM0"?

Restriction and Notes Values representing a time in the past result in an error.

Mode SA, IQ(Basic)

Preset 0

State Saved Saved in instrument state.

Min 0.0

Max 0.999999

Instrument S/W Revision Prior to A.02.00

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.

Remote Command :TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue]:RELative "alarmEvent", <seconds>

Example :TRIG:LXI:ALAR:TIME:REL "ALARM0",60.0s

Mode SA, IQ(Basic)

Range 0.0 – 1.7976931348623157 x 10308 (Max Double)

Instrument S/W Revision Prior to A.02.00

Remote Command :TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue]:RELative? "alarmEvent"

Example :TRIG:LXI:ALAR:TIME:REL "ALARM0"?

Mode SA, IQ(Basic)

Range 0.0 – 1.7976931348623157 x 10308 (Max Double)

Instrument S/W Revision Prior to A.02.00

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>

Trigger

| | |
|-------------------------|--|
| 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 |
| Key Path | Trigger, 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) |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Key Path | Trigger, 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) |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Key Path | Trigger, LXI Trigger, Alarm, <alarmEvent> |
| Mode | SA, IQ(Basic) |
| Preset | 1 |
| State Saved | Saved in instrument state. |
| Range | 1 – 2,147,483,647 |
| Instrument S/W Revision | Prior to A.02.00 |

Remote Command :TRIGger [:SEquence] :LXI :ALARm [:SET] :REPeat?
"alarmEvent "

| | |
|-------------------------|--|
| Example | :TRIG:LXI:ALAR:REP "ALARM0",10 |
| Key Path | Trigger, LXI Trigger, Alarm, <alarmEvent> |
| Mode | SA, IQ(Basic) |
| Preset | 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 2,147,483,647 |
| Instrument S/W Revision | Prior to A.02.00 |

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 |
| Key Path | Trigger, LXI Trigger, Alarm, <alarmEvent> |
| Mode | SA, IQ(Basic) |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | 1 0 |
| Instrument S/W Revision | Prior to A.02.00 |

Remote Command :TRIGger[:SEQuence]:LXI:ALARm[:SET]:ENABled?
"alarmEvent"

| | |
|-------------------------|--|
| Example | :TRIG:LXI:ALAR:ENAB "ALARM0"? |
| Key Path | Trigger, LXI Trigger, Alarm, <alarmEvent> |
| Mode | SA, IQ(Basic) |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | 1 0 |
| Instrument S/W Revision | Prior to A.02.00 |

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

Trigger

command.

| | |
|-------------------------|---|
| 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 |
| Mode | SA, IQ(Basic) |
| Instrument S/W Revision | Prior to A.02.00 |

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: | Prior to A.02.00 |

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.

| | |
|-------------------------|---|
| Key Path | Trigger |
| Mode | SA, IQ(Basic) |
| State Saved | No |
| Readback | The Baseband I/Q trigger source that becomes active when this key is selected is displayed. The possible values are "I/Q Mag", "I", "Q", "Input I", "Input Q", and "Aux I/Q Mag". |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|------------------------------|
| Example | TRIG:<meas>:SOUR IQM |
| Key Path | Trigger, Baseband I/Q |
| Readback Text | I/Q Mag |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|---|
| Remote Command | <code>:TRIGger[:SEquence]:IQMag:LEVel <amp1 ></code> <code>:TRIGger[:SEquence]:IQMag:LEVel?</code> |
| Remote Command Notes | The I/Q reference impedance is used for converting between power and voltage. |
| Example | TRIG:IQM:LEV -30 dBm |
| Key Path | Trigger, Baseband I/Q, I/Q Mag |
| Preset | -25 dBm |
| State Saved | Saved in instrument state. |
| Range | -200 dBm to 100 dBm |
| Readback Text | <level> dBm |
| Instrument S/W Revision | Prior to A.02.00 |

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]:IQMag:SLOPe POSitive NEGative</code> <code>:TRIGger[:SEquence]:IQMag:SLOPe?</code> |
| Example | TRIG:IQM:SLOP POS |
| Key Path | Trigger, Baseband I/Q, I/Q Mag |
| Preset | POSitive |
| State Saved | Saved in instrument state. |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-----------------------|--|
| Remote Command | <code>:TRIGger[:SEquence]:IQMag:DELay <time></code> <code>:TRIGger[:SEquence]:IQMag:DELay?</code> <code>:TRIGger[:SEquence]:IQMag:DELay:STATe OFF ON 0 1</code> <code>:TRIGger[:SEquence]:IQMag:DELay:STATe?</code> |
| Example | TRIG:IQM:DEL 10 ms TRIG:IQM:DEL:STAT ON |
| Key Path | Trigger, Baseband I/Q, I/Q Mag |

Trigger

| | |
|-------------------------|----------------------------|
| Preset | 1 us OFF |
| State Saved | Saved in instrument state. |
| Range | -2.5 s to +10 s |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|------------------------------|
| Example | TRIG:<meas>:SOUR IDEM |
| Key Path | Trigger, Baseband I/Q |
| Readback Text | I |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|---|
| Remote Command | :TRIGger[:SEquence]:IDEMod:LEVel <voltage> :TRIGger[:SEquence]:IDEMod:LEVel? |
| Example | TRIG:IDEM:LEV 0.5 V |
| Key Path | Trigger, Baseband I/Q, I (Demodulated) |
| Preset | 0.25 V |
| State Saved | Saved in instrument state. |
| Range | -1 to 1 V |
| Readback Text | 0.1 of displayed unit (V, mV, etc.) |
| Instrument S/W Revision | Prior to A.02.00 |

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]:IDEMod:SLOPe POSitive NEGative :TRIGger[:SEquence]:IDEMod:SLOPe? |
| Example | TRIG:IDEM:SLOP POS |
| Key Path | Trigger, Baseband I/Q, I (Demodulated) |
| Preset | POSitive |

| | |
|-------------------------|----------------------------|
| State Saved | Saved in instrument state. |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|--|
| 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? |
| Example | TRIG:IDEM:DEL 10 ms TRIG:IDEM:DEL:STAT ON |
| Key Path | Trigger, Baseband I/Q, I (Demodulated) |
| Preset | 1 us OFF |
| State Saved | Saved in instrument state. |
| Range | -2.5 s to +10 s |
| Instrument S/W Revision | Prior to A.02.00 |

Q (Demodulated)

Pressing this key, when it is not selected, selects the main receiver's output Q voltage as the trigger. The Q (Demodulated) trigger condition is met when the Q voltage crosses the Q voltage trigger level.

| | |
|-------------------------|------------------------------|
| Example | TRIG:<meas>:SOUR QDEM |
| Key Path | Trigger, Baseband I/Q |
| Readback Text | Q |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-----------------------|---|
| Remote Command | :TRIGger[:SEquence]:QDEMod:LEVel <voltage> :TRIGger[:SEquence]:QDEMod:LEVel? |
| Example | TRIG:QDEM:LEV 0.5 V |
| Key Path | Trigger, Baseband I/Q, Q (Demodulated) |
| Preset | 0.25 V |

Trigger

| | |
|-------------------------|-------------------------------------|
| State Saved | Saved in instrument state. |
| Range | -1 to 1 V |
| Readback Text | 0.1 of displayed unit (V, mV, etc.) |
| Instrument S/W Revision | Prior to A.02.00 |

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]:QDEMod:SLOPe POSitive NEGative :TRIGger[:SEquence]:QDEMod:SLOPe? |
| Example | TRIG:QDEM:SLOP POS |
| Key Path | Trigger, Baseband I/Q, Q (Demodulated) |
| Preset | POSitive |
| State Saved | Saved in instrument state. |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|--|
| 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? |
| Example | TRIG:QDEM:DEL 10 ms TRIG:QDEM:DEL:STAT ON |
| Key Path | Trigger, Baseband I/Q, Q (Demodulated) |
| Preset | 1 us OFF |
| State Saved | Saved in instrument state. |
| Range | -2.5 s to +10 s |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|---------|-----------------------|
| Example | TRIG:<meas>:SOUR IINP |
|---------|-----------------------|

| | |
|-------------------------|------------------------------|
| Key Path | Trigger, Baseband I/Q |
| Readback Text | Input I |
| Instrument S/W Revision | Prior to A.02.00 |

Trigger Level Sets a level for the Input I trigger. When the signal crosses this level, with the chosen slope, the trigger occurs.

| | |
|-----------------------|---|
| Remote Command | :TRIGger[:SEquence]:IINPut:LEVel <voltage> :TRIGger[:SEquence]:IINPut:LEVel? |
|-----------------------|---|

Example TRIG:IINP:LEV 0.5 V

| | |
|-------------------------|---------------------------------------|
| Key Path | Trigger, Baseband I/Q, Input I |
| Preset | 0.25 V |
| State Saved | Saved in instrument state. |
| Range | -1 to 1 V |
| Readback Text | 0.1 of displayed unit (V, mV, etc.) |
| Instrument S/W Revision | Prior to A.02.00 |

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]:IINPut:SLOPe POSitive NEGative :TRIGger[:SEquence]:IINPut:SLOPe? |
|-----------------------|---|

Example TRIG:IINP:SLOP POS

| | |
|-------------------------|---------------------------------------|
| Key Path | Trigger, Baseband I/Q, Input I |
| Preset | POSitive |
| State Saved | Saved in instrument state. |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-----------------------|--|
| 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? |
|-----------------------|--|

Example TRIG:IINP:DEL 10 ms
TRIG:IINP:DEL:STAT ON

Trigger

| | |
|-------------------------|---------------------------------------|
| Key Path | Trigger, Baseband I/Q, Input I |
| Preset | 1 us OFF |
| State Saved | Saved in instrument state. |
| Range | -2.5 s to +10 s |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|------------------------------|
| Example | TRIG:<meas>:SOUR QINP |
| Key Path | Trigger, Baseband I/Q |
| Readback Text | Input Q |
| Instrument S/W Revision | Prior to A.02.00 |

Trigger Level Sets a level for the Input Q trigger. When the signal crosses this level, with the chosen slope, the trigger occurs.

| | |
|-------------------------|---|
| Remote Command | :TRIGger[:SEquence]:QINPut:LEVel <voltage> :TRIGger[:SEquence]:QINPut:LEVel? |
| Example | TRIG:QINP:LEV 0.5 V |
| Key Path | Trigger, Baseband I/Q, Input Q |
| Preset | 0.25 V |
| State Saved | Saved in instrument state. |
| Range | -1 to 1 V |
| Readback Text | 0.1 of displayed unit (V, mV, etc.) |
| Instrument S/W Revision | Prior to A.02.00 |

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]:QINPut:SLOPe Positive NEGative :TRIGger[:SEquence]:QINPut:SLOPe? |
| Example | TRIG:QINP:SLOP POS |
| Key Path | Trigger, Baseband I/Q, Input Q |

| | |
|-------------------------|----------------------------|
| Preset | POSitive |
| State Saved | Saved in instrument state. |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-----------------------|--|
| 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? |
|-----------------------|--|

| | |
|---------|--|
| Example | TRIG:QINP:DEL 10 ms TRIG:QINP:DEL:STAT ON |
|---------|--|

Key Path **Trigger, Baseband I/Q, Input Q**

| | |
|-------------------------|----------------------------|
| Preset | 1 us OFF |
| State Saved | Saved in instrument state. |
| Range | -2.5 s to +10 s |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|------------------------------|
| Example | TRIG:<meas>:SOUR AIQM |
| Key Path | Trigger, Baseband I/Q |
| Readback Text | Aux I/Q Mag |
| Instrument S/W Revision | Prior to A.02.00 |

Trigger Level Sets a level for the I/Q magnitude trigger. When the signal crosses this level, with the chosen slope, the trigger occurs.

| | |
|-----------------------|---|
| Remote Command | :TRIGger[:SEquence]:AIQMag:LEVel <ampl > :TRIGger[:SEquence]:AIQMag:LEVel? |
| Remote Command Notes | The I/Q reference impedance is used for converting between power and voltage. |

Trigger

| | |
|-------------------------|---|
| Example | TRIG:AIQM:LEV -30 dBm |
| Key Path | Trigger, Baseband I/Q, Aux Channel I/Q Mag |
| Preset | -25 dBm |
| State Saved | Saved in instrument state. |
| Range | -200 dBm to 100 dBm |
| Readback Text | <level> dBm |
| Instrument S/W Revision | Prior to A.02.00 |

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]:AIQMag:SLOPe POSitive NEGative :TRIGger[:SEquence]:AIQMag:SLOPe? |
| Example | TRIG:AIQM:SLOP POS |
| Key Path | Trigger, Baseband I/Q, Aux Channel I/Q Mag |
| Preset | POSitive |
| State Saved | Saved in instrument state. |
| Instrument S/W Revision | Prior to A.02.00 |

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.

| | |
|-------------------------|--|
| 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? |
| Example | TRIG:AIQM:DEL 10 ms TRIG:AIQM:DEL:STAT ON |
| Key Path | Trigger, Baseband I/Q, Aux Channel I/Q Mag |
| Preset | 1 us OFF |
| State Saved | Saved in instrument state. |
| Range | -2.5 s to +10 s |
| Instrument S/W Revision | Prior to A.02.00 |

Trigger Center Frequency This key sets the center frequency to be used by the auxiliary receiver.

| | |
|-------------------------|--|
| Remote Command | :TRIGger[:SEQuence]:AIQMag:CENTer <freq> :TRIGger[:SEQuence]:AIQMag:CENTer? |
| Restriction and Notes | Trigger CF + 1/2 Trigger BW < Max Trigger CF – 1/2 Trigger BW > Min |
| Example | :TRIG:AIQM:CENT 10 MHz |
| Key Path | Trigger, Baseband I/Q, Aux Channel I/Q Mag |
| Preset | 0 Hz |
| State Saved | Saved in instrument state. |
| Range | –40 MHz to 40 MHz |
| Instrument S/W Revision | Prior to A.02.00 |

Trigger Bandwidth This key sets the information bandwidth used by the auxiliary receiver for the Auxiliary Channel I/Q Magnitude trigger.

| | |
|-------------------------|--|
| Remote Command | :TRIGger[:SEQuence]:AIQMag:BANDwidth <freq> :TRIGger[:SEQuence]:AIQMag:BANDwidth? |
| 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 |
| Key Path | Trigger, Baseband I/Q, Aux Channel I/Q Mag |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |

Trigger

Auto/Holdoff

Opens up a menu that lets you adjust Auto Trigger and Trigger Holdoff parameters

| | |
|-------------------------|--|
| Key Path | Trigger |
| Readback line | Displays a summary of the Auto Trig and Holdoff settings, in square brackets First line: Auto Off or Auto On Second Line: “Hldf” followed by: <ul style="list-style-type: none">• If Holdoff is Off, readback Off• If Holdoff On and Type = Normal, readback value• If Holdoff On and Type = Above, readback value followed by AL• If Holdoff On and Type = Below, readback value followed by BL• If Holdoff Type selection is not supported by the current measurement, Holdoff Type is always Normal |
| Instrument S/W Revision | A.02.00 |

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: | Trigger, Auto/Holdoff |
| Default Unit: | s |
| Instrument S/W Revision: | Prior to A.02.00 |

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 |
| Preset: | Off, 100 ms |
| State Saved: | Saved in instrument state. |
| Min: | 0 s |
| Max: | 0.5 s |
| Key Path: | Trigger, Auto/Holdoff |
| Default Unit: | s |
| Instrument S/W Revision: | Prior to A.02.00 |

Holdoff Type

Lets you set the Trigger Holdoff Type.

| | |
|-------------|---|
| NOTE | Holdoff Type is not supported by all measurements. If the current measurement does not support it, this key will be blank and the Holdoff Type will be Normal. If the Holdoff Type SCPI is sent while in such a measurement, the SCPI will be accepted and the setting remembered, but it will have no effect until a measurement is in force that supports Holdoff Type. |
|-------------|---|

Trigger Holdoff Type functionality:

NORMAL

This is the “oscilloscope” type of trigger holdoff, and is the setting when the Holdoff Type key does not appear. In this type of holdoff, no new trigger will be accepted until the holdoff interval has expired after the previous trigger.

ABOVE

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.

BELow

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

Trigger

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.

| | |
|--------------------------|--|
| Remote Command: | :TRIGger[:SEquence]:HOLDoff:TYPE NORMal ABOVE BELOW :TRIGger[:SEquence]:HOLDoff:TYPE? |
| Example: | TRIG:HOLD:TYPE NORM |
| Mode: | GSM/EDGE |
| Preset: | All modes but GSM/EDGE: Normal GSM/EDGE: Below |
| State Saved: | Saved in instrument state. |
| Key Path: | Trigger, Auto/Holdoff |
| Instrument S/W Revision: | A.02.00 |

Trigger Offset (Remote Command Only)

ESA Backwards Compatibility command

| | |
|--------------------------|--|
| Remote Command: | :TRIGger[:SEquence]:OFFSet <time> :TRIGger[:SEquence]:OFFSet? :TRIGger[:SEquence]:OFFSet:STATe OFF ON 0 1 :TRIGger[:SEquence]:OFFSet:STATe? |
| Example: | TRIG:OFFS ON TRIG:OFFS -100 ms |
| Remote Command Notes: | These are ESA commands for trigger offset that allowed you to use a positive or negative delay when in zero span and in a Res BW \geq 1 kHz. For ESA compatibility, X-series analyzers keep track of this offset and add it to the Trigger Delay for line, video or external whenever the value is sent to the hardware, if in Zero Span and RBW \geq 1 kHz. |
| Preset: | Off, 0 s |
| State Saved: | Saved in instrument state. |
| Min: | -11 s |
| Max: | +11 s |
| Instrument S/W Revision: | Prior to A.02.00 |

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 | Prior to A.02.00 |

Display

The **Display** menu is common to most measurements, and is used for configuring items on the display. Some **Display** menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the **System Display Settings** key apply to all measurements in all modes.

| | |
|-------------------------|---------------------|
| Key Path | View/Display |
| Instrument S/W Revision | Prior to A.02.00 |

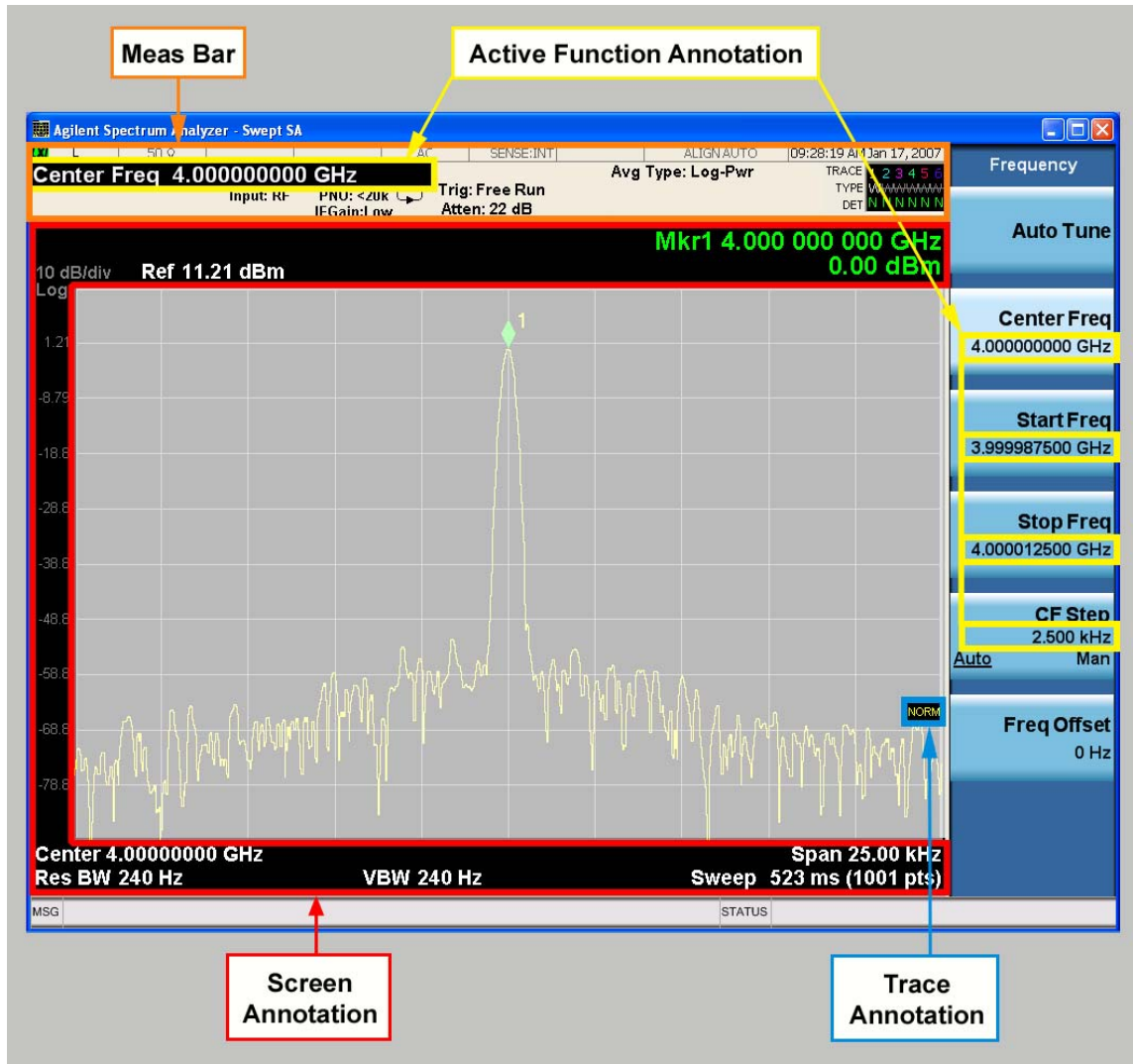
Annotation

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.

See figure below. Each type of annotation can be turned on and off individually.

View/Display



Key Path **View/Display, Display**

Instrument S/W Revision Prior to A.02.00

Meas Bar On/Off This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

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: | Prior to A.02.00 |

Screen This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

| | |
|--------------------------|---|
| 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: | Prior to A.02.00 |

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.

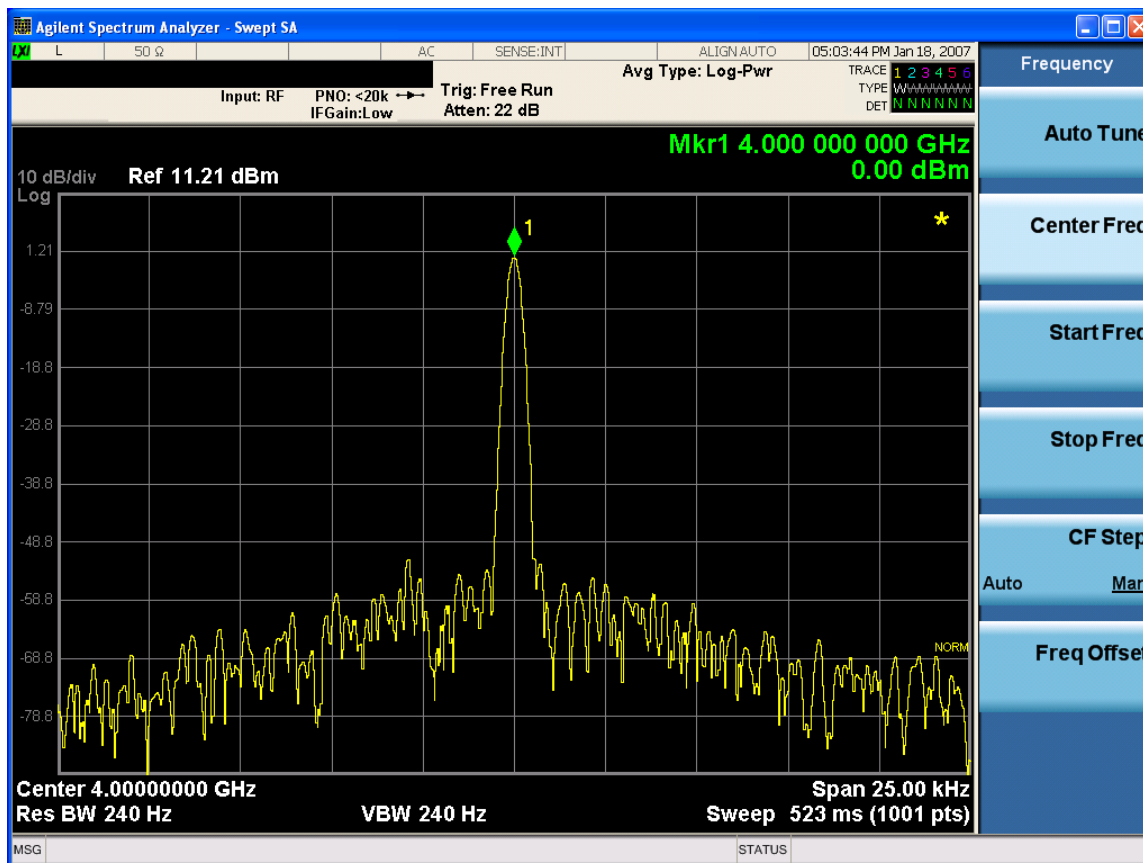
| | |
|--------------------------|--|
| Remote Command: | :DISPlay:ANNOtation:TRACe[:STATe] ON OFF 1 0 :DISPlay:ANNOtation:TRACe[:STATe]? |
| Example: | DISP:ANN:TRAC OFF |
| Preset: | Off |
| State Saved: | Saved in instrument state. |
| Key Path: | View/Display, Display, Annotation |
| Instrument S/W Revision: | Prior to A.02.00 |

Active Function Values On/Off Turns on/off the active function display in the Meas Bar, and all of the

View/Display

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: Prior to A.02.00

Title

Displays menu keys that enable you to change or clear a title on your display.

| | |
|-------------------------|------------------------------|
| Key Path | View/Display, Display |
| Instrument S/W Revision | Prior to A.02.00 |

Change Title Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press **Change Title** again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing **Title, Clear Title**.

NOTE Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; 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 |
|---------|---|

| | |
|-------------------------|-------------------------------------|
| Key Path | View/Display, Display, Title |
| Mode | All |
| Preset | No title (measurement name instead) |
| State Saved | Saved in instrument state. |
| Instrument S/W Revision | Prior to A.02.00 |

Clear Title Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

| | |
|----------|---|
| 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: | Prior to A.02.00 |

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

| | |
|--------------------------|---|
| 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: | Prior to A.02.00 |

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: | Prior to A.02.00 |

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by **Restore Misc Defaults** or **Restore System Defaults** under System.

| | |
|-------------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Instrument S/W Revision | Prior to A.02.00 |

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: | Prior to A.02.00 |

Theme This key allows you to change the Display theme. This is similar to the Themes selection under

View/Display

Page Setup and Save Screen Image. The four themes are detailed below.

| | |
|--------------------------|---|
| Remote Command: | <code>:DISPlay:THEME TDColor TDMonochrome FCOLor FMONochrome</code> <code>:DISPlay:THEME?</code> |
| 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: | Prior to A.02.00 |

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: | <code>:DISPlay:BACKlight ON OFF</code> <code>:DISPlay:BACKlight?</code> |
| Preset: | ON (Set by Restore Misc Defaults) |
| Key Path: | View/Display, Display, System Display Settings |
| Instrument S/W Revision: | Prior to A.02.00 |

On Turns the display backlight on.

| | |
|--------------------------|--|
| Example: | DISP:BACK ON |
| Key Path: | View/Display, Display, System Display Settings, Backlight |
| Readback: | On |
| Instrument S/W Revision: | Prior to A.02.00 |

Off Turns the display backlight off.

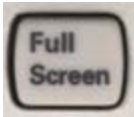
| | |
|-----------|--|
| Example: | DISP:BACK OFF |
| Key Path: | View/Display, Display, System Display Settings, Backlight |

Readback: Off
 Instrument S/W Revision: Prior to A.02.00

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: Prior to A.02.00

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: Prior to A.02.00

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: | <code>:DISPlay:ENABle OFF ON 0 1</code> <code>:DISPlay:ENABle?</code> |
| Example: | <code>DISP:ENAB OFF</code> |
| Dependencies/Couplings: | <code>DISP:ENAB OFF</code> turns Backlight OFF and <code>DISP:ENAB ON</code> turns Backlight ON. However, settings of Backlight do not change the state of <code>DISP:ENAB</code> |
| Preset: | On Set by <code>SYST:DEF MISC</code> , but Not affected by <code>*RST</code> or <code>SYSTem:PRESet</code> . |
| State Saved: | Not saved in instrument state. |
| Instrument S/W Revision: | Prior to A.02.00 |

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 89](#) 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 |
|-------------------------|------------------|
| Instrument S/W Revision | Prior to A.02.00 |

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, IDEN |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk |
| Remote Command | :DISP:play:<meas>:TRACe[1] 2 3 4 : Y [: SCALe] : AUTO : ONCE |
| Example | :DISP:VECT:TRAC1:Y:AUTO:ONCE |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Y Scale Per Division

This controls the Y scale per division of the selected trace.

| | |
|------------------------|---|
| Key Path | AMPTD/YScale |
| Mode | VSA, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer 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 |

Common Measurement Functions 2

Y Axis Scaling

| | |
|--------------------------|------------------|
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk |
| Remote Command | :DISPlay:<meas>:TRACe[1] 2 3 4:Y[:SCALe]:RPOStion TOP CENTer BOTTom :DISPlay:<meas>:TRACe[1] 2 3 4:Y[:SCALe]:RPOStion? |

| | |
|--------------------------|---|
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWER 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 |
| Readback Text | Auto Peak RMS Power mRMS |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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 |
|----------|---------------------|

Common Measurement Functions 2

Y Axis Scaling

| | |
|--------------------------|---|
| Mode | VSA, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk |
| Remote Command | :DISPlay:<meas>:TRACe[1] 2 3 4:Y:UNIT? |
| Example | DISP:VECT:TRAC1:Y:UNIT? |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Reference Line

This controls whether the Y reference line is visible or not.

| | |
|--------------------------|--|
| Key Path | AMPTD/YScale |
| Mode | VSA, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer 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. |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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.

Common Measurement Functions 2

BW (Bandwidth)

| | |
|--------------------------|---|
| Key Path | BW |
| Mode | VSA |
| Measurement | <meas>:=VECTor ADEMod IPOWER IDEMod MOTotalk |
| Remote Command | [:SENSE] :<meas>:BANDwidth BWIDth[:RESolution] <bandwidth> [:SENSE] :<meas>:BANDwidth BWIDth[:RESolution]? |
| Example | VECT:BWID 200 KHZ VECT:BWID? |
| Notes | Key blanked in any other measurement than Vector or Analog Demod |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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 |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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) |
|-------------|--------------|------------------------|

Common Measurement Functions 2

BW (Bandwidth)

| | | |
|----------|---|---------|
| 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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWER 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) |
| Readback Text | Uniform Hanning Gaussian Flat Top |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Center Freq

Sets the frequency of the display Center.

| | |
|----------------|--|
| Key Path | FREQ Channel |
| Mode | VSA, LTE, IDEN |
| Remote Command | [:SENSE] :FREQuency:CENTer <freq> [:SENSe] :FREQuency:CENTer? |

Common Measurement Functions 2

FREQ Channel

| | |
|--------------------------|--|
| 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. |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Start Freq

Sets the frequency of the display Start.

| | |
|--------------------------|---|
| Key Path | FREQ Channel |
| Mode | VSA, LTE, IDEN |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Stop Freq

Sets the frequency of the display Stop.

| | |
|----------|---------------------|
| Key Path | FREQ Channel |
| Mode | VSA, LTE, IDEN |

| | |
|--------------------------|--|
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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 |

Common Measurement Functions 2
FREQ Channel

| | |
|--------------------------|------------------|
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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 Analyzer Setup, Marker for a description of this function.

| | |
|--------------------------|--------------------|
| Key Path | Front Panel |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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 |
| Mode | VSA, LTE, IDEN |
| State Saved | No |
| Range | 1 2 3 4 5 6 7 8 9 10 11 12 |

| | |
|--------------------------|------------------|
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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:MODE POSITION DELTA FIXed =OFF :CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MODE? |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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” on page 764](#)

| | |
|----------|---------------|
| Key Path | Marker |
|----------|---------------|

| | |
|--------------------------|------------------|
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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

Common Measurement Functions 2

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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” on page 764](#)

| Key Path | Marker |
|--------------------------|------------------|
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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” on page 764](#)

| Key Path | Marker |
|--------------------------|------------------|
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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” on page 764](#)

| | |
|--------------------------|------------------|
| Key Path | Marker |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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.

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Marker

Instead, you use the Marker X and Marker Y (imag) controls to move the marker horizontally and vertically.

| | |
|--------------------------|--|
| Key Path | Marker, Marker Position |
| Mode | VSA, LTE, IDEN |
| 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: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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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[: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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Marker X Unit may be queried via SCPI

| | |
|--------------------------|---|
| Mode | VSA, LTE, IDEN |
| 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:X: UNIT? |
| Example | CALC:VECT:MARK:X:UNIT? |
| Notes | Query Only |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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[: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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Marker Y Unit may be queried via SCPI.

| | |
|------|----------------|
| Mode | VSA, LTE, IDEN |
|------|----------------|

| | |
|--------------------------|---|
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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: 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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: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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Marker Z Unit may be queried via SCPI.

| | |
|----------------|---|
| Mode | VSA, LTE, IDEN |
| 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:Z: UNIT? |

| | |
|--------------------------|------------------------|
| Example | CALC:OFDM:MARK:Z:UNIT? |
| Notes | Query Only |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Marker Properties

The Marker Properties key accesses a menu of common marker properties.

| | |
|-------------------------|------------------|
| Key Path | Marker |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |

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, IDEN |
| 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: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 |

Common Measurement Functions 2

Marker

| | |
|--------------------------|----------------------------|
| State Saved | Saved in instrument state. |
| Range | 1 2 3 4 5 6 7 8 9 10 11 12 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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 :CFORmat RECTangular POLar :CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :CFORmat? |
| Example | CALC:VECT:MARK1:CFOR RECT CALC:VECT:MARK1:CFOR? |
| Preset | RECT |
| State Saved | Saved in instrument state. |
| Range | Rect Polar |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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 :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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWER IDEMod MOTalk |
| Remote Command | :CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :FCOunt[:STATe] OFF ON 0 1 :CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :FCOunt[: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 |

Common Measurement Functions 2

Marker

| | |
|--------------------------|------------------|
| Instrument S/W Revision | Prior to A.02.00 |
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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, IDEN |
| 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 :FCOunt:X? |
| Example | CALC:VECT:MARK:FCO:X? |
| Notes | Query only. If the marker counter result is unavailable, NaN is returned. |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWER 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

All Markers Off

This function turns all markers off and sets the selected marker to 1.

| | |
|--------------------------|---|
| Key Path | Marker |
| Mode | VSA, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk |
| Remote Command | :CALCulate:<meas>:MARKer:AOFF |
| Example | CALC:VECT:MARK:AOFF: |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Marker -> (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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |

Modified at S/W Revision A.02.00

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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: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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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 |
| | | Power | W |
| | | Any | Vrms^2 |
| Vector, Constellation, Eye, Trellis | Wrap Phase, Unwrap Phase, Delay | Any | Vrms^2 |
| | Any | blanked | |

Common Measurement Functions 2

Marker Function

| | | | |
|--|---|-----|----------------------------|
| Dimensionless (e.g., Frequency response, Impulse response, various Demodulation error types) | LogMag (dB) Linear Mag, Real, Imag, Wrap Phase, Unwrap Phase, Delay, Log Mag (lin) | Any | dBrms rms^2 |
| General dimensions(e.g., Hz, %) | LogMag (dB) Linear Mag, Real, Imag, Wrap Phase, Unwrap Phase, Delay, Log Mag (lin) | Any | dB<unit>rms <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, IDEN |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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 ".

Common Measurement Functions 2

Marker Function

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, IDEN |
| 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:FU Nction:BDENsity:CTYPe MEAN RMS :CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:FU Nction: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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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: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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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: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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Band/Interval Left

This function adjusts the left side of the band. In order to remain centered in the band, the marker

Common Measurement Functions 2

Marker Function

position must also change as you change the left edge. The right edge is unaffected.

| | |
|--------------------------|--|
| Key Path | Marker Function, Band Adjust |
| Mode | VSA, LTE, IDEN |
| 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: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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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: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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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 rHz 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 /rHz for voltage calculations.

| Key Path | Marker Function |
|--------------------------|------------------|
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk |
| Remote Command | [:SENSE] : <meas> : AVERAge : TCONtrol EXPonential REPeat [:SENSE] : <meas> : AVERAge : TCONtrol ? |

Common Measurement Functions 2

Meas Setup

| | |
|--------------------------|---------------------------------------|
| Example | VECT:AVER:TCON EXP VECT:AVER:TCON? |
| Preset | EXP |
| State Saved | Saved in instrument state. |
| Range | Exp Repeat |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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. |

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWER 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWER 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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 |
|----------|--|

Common Measurement Functions 2

Meas Setup

| | |
|--------------------------|---|
| Mode | VSA, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWER 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? |
| Example | VECT: AVER: FAST: URAT 20 VECT: AVER: FAST: URAT? VECT: AVER: FAST: URAT: AUTO ON VECT: AVER: FAST: URAT: AUTO? |
| Preset | 10 ON |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 2147483647 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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.

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, IDEN |
| 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: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." |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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,

Common Measurement Functions 2

Peak Search

the result is the same as if you sent a Peak Search command.

| | |
|--------------------------|---|
| Key Path | Peak Search |
| Mode | VSA, LTE, IDEN |
| 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:MA Ximum:NEXT |
| Example | CALC:VECT:MARK2:MAX:NEXT |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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:MA Ximum:PREVIOUS |
| Example | CALC:VECT:MARK2:MAX:PREV |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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:MA Ximum:RIGHT |
| Example | CALC:VECT:MARK2:MAX:RIGH |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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:MA Ximum:LEFT |
| Example | CALC:VECT:MARK2:MAX:LEFT |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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:CP Search[:STATE] ON OFF 1 0 :CALCulate:<meas>:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:CP Search[: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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |

| | |
|--------------------------|--|
| 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 |
| Readback Text | [25 MHz] If playing back a recording, list the recorded bandwidth here |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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 |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |

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.

Common Measurement Functions 2

SPAN X Scale

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.

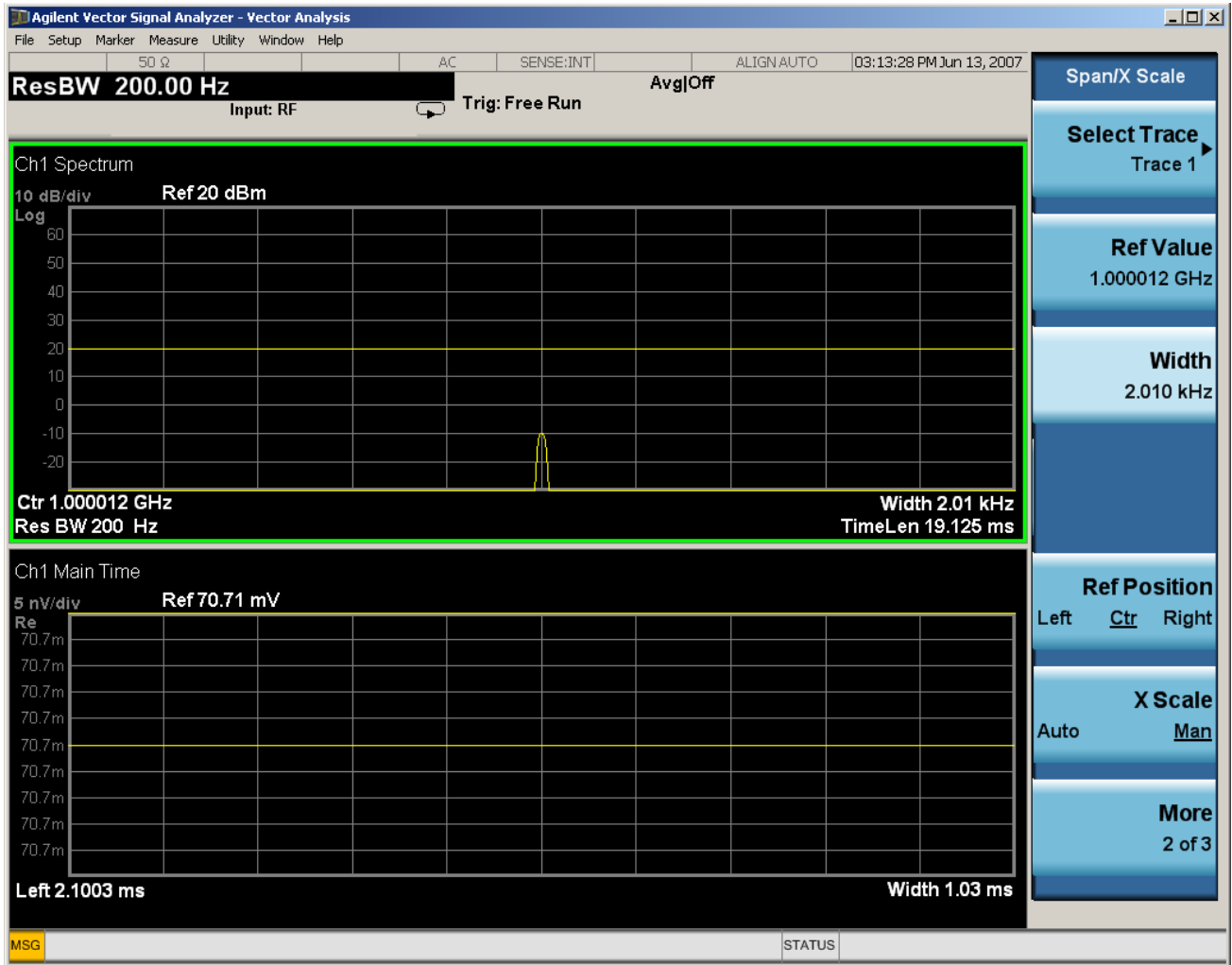
For Vector displays (I-Q and Constellation) the X axis is actually perpendicular to the screen, and the screen's horizontal axis is used for the real part of the Y values. In this case, the X scaling can still be used to only display a portion of the data. In the case of the X reference position, left 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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |

Common Measurement Functions 2

SPAN X Scale

Modified at S/W Revision A.02.00

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWER 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

X Reference Position

This determines the position from which the X scaling is calculated for the selected trace. It may be set to

Common Measurement Functions 2

SPAN X Scale

the left side, center, or right side of the grid.

| | |
|--------------------------|--|
| Key Path | SPAN/XScale |
| Mode | VSA, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

All Frequency Points

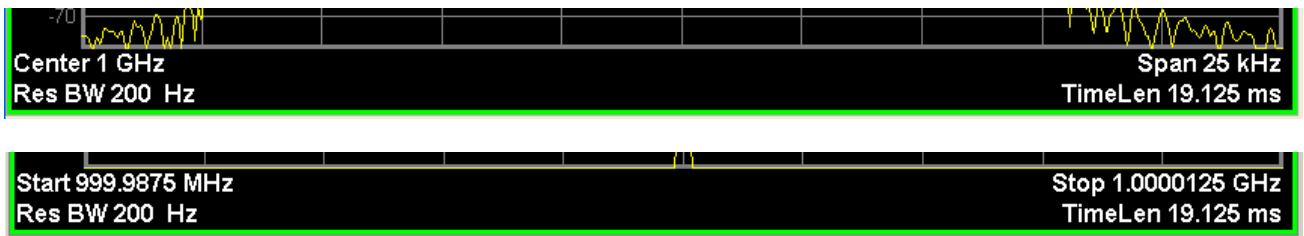
Spectrum trace data (and PSD) are based on the FFT algorithm. By default, the outer edges of the spectrum are not displayed because they may show spurious results that are aliases of real signals that are not completely filtered out by the IF filter. For example, in the case of a 1024 point FFT only 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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk |
| Remote Command | :DISPlay:<meas>:AFPoints OFF ON 0 1 :DISPlay:<meas>:AFPoints? |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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

Common Measurement Functions 2
SPAN X Scale

- X Width
- X Scale (Auto/Man)
-

| | |
|--------------------------|-------------------------------------|
| Key Path | SPAN X Scale, X Axis Scaling |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Trace/Detector

This key accesses a menu allowing you to select various trace parameters for all VSA based measurements.

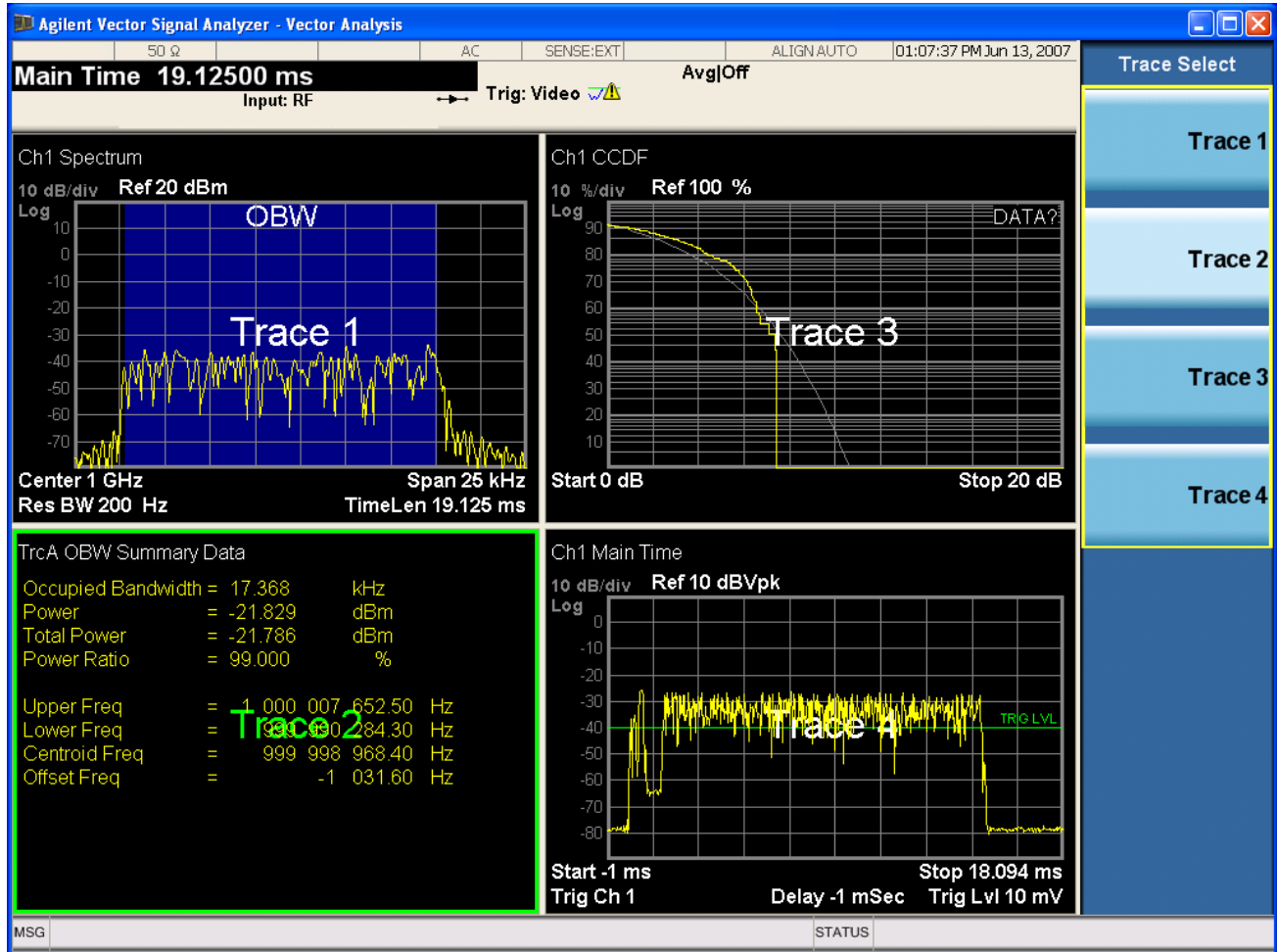
| | |
|--------------------------|--------------------|
| Key Path | Front Panel |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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.

Common Measurement Functions 2

Trace/Detector



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, IDEN |
| 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 |
| Readback Text | Trace <n> |

| | |
|--------------------------|------------------|
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWER IDEMod MOTotalk |
| Remote Command | :DISPlay:<meas>:TRACe[1] 2 3 4:FEED <string> :DISPlay:<meas>:TRACe[1] 2 3 4:FEED? |

Common Measurement Functions 2

Trace/Detector

| | |
|--------------------------|---|
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM 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. |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, “Data” on page 811.

| | |
|--------------------------|-----------------------------|
| Key Path | Trace/Detector, Data |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Inst Spectrum

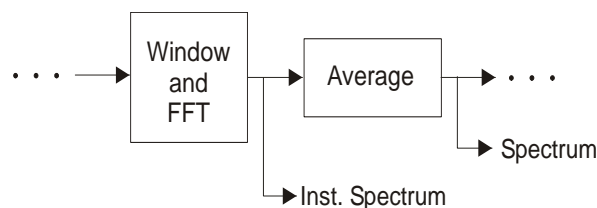
This key assigns the selected trace to display the Inst. Spectrum data result.

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 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, “Data” on page 811.

| | |
|--------------------------|-----------------------------|
| Key Path | Trace/Detector, Data |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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.

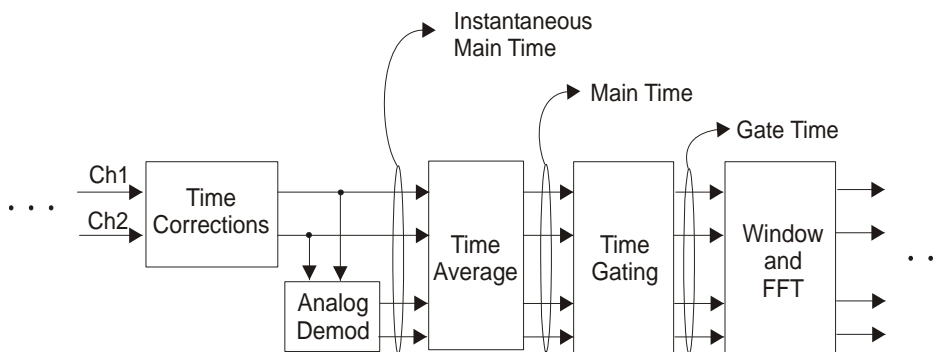
A time record is the basic building block of the Fast Fourier Transform (FFT). The FFT takes the time-domain information in the time record and transforms it into the frequency domain.

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 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, "Data" on page 811.

| | |
|--------------------------|-----------------------------|
| Key Path | Trace/Detector, Data |
| Mode | VSA |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

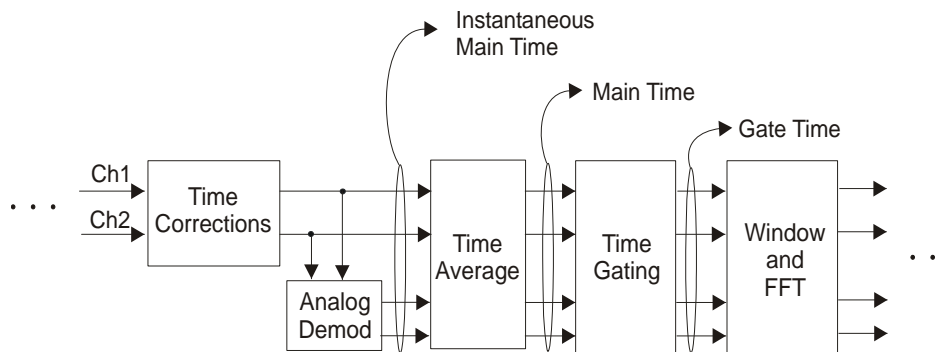
Inst Main Time

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 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, [“Data” on page 811](#).

| | |
|--------------------------|-----------------------------|
| Key Path | Trace/Detector, Data |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, [“Data” on page 811](#).

| | |
|--------------------------|-----------------------------|
| Key Path | Trace/Detector, Data |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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” on page 815](#) with the following exceptions:

- This data has not had time corrections applied, so it displays a "CAL?" trace indicator.
- 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, “Data” on page 811.

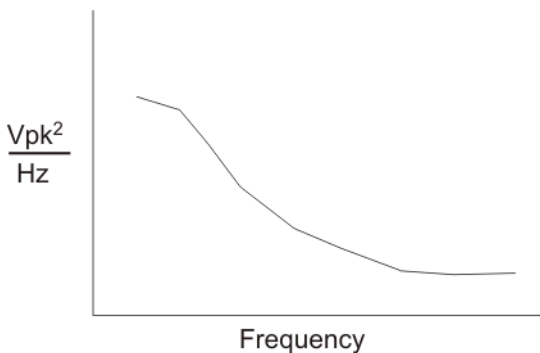
| | |
|--------------------------|-----------------------------|
| Key Path | Trace/Detector, Data |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

PSD (Power Spectral Density)

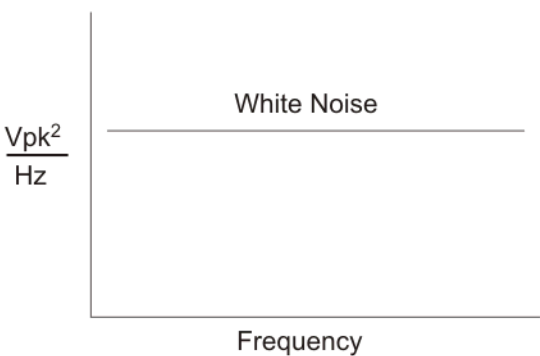
This key assigns the selected trace to display the Power Spectral Density (PSD) data result.

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 Vpk2/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 Vpk2.

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:

$$\frac{\text{dBm}}{\text{Hz}} = 10 \log \left[\frac{\frac{V_{\text{rms}}^2}{Z} \times 1000}{\text{RBW}} \right]$$

where:

RBW = resolution bandwidth (Hz)

Z = input impedance

See also Trace/Detector, “Data” on page 811.

| | |
|--------------------------|-----------------------------|
| Key Path | Trace/Detector, Data |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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:

Common Measurement Functions 2

Trace/Detector

1. Calculate the RMS value for all measured samples; this becomes the 0 dB point at the left end of the x-axis.
2. Normalize all samples to the RMS value in units of dB.
3. Determine which x-axis bin each sample belongs in between 0 and 20 dB.
4. 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, [“Data” on page 811](#).

| | |
|--------------------------|-----------------------------|
| Key Path | Trace/Detector, Data |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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 for further details, see that topic

See also Trace/Detector, [“Data” on page 811](#).

| | |
|--------------------------|-----------------------------|
| Key Path | Trace/Detector, Data |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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 measured³/₄the 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, [“Data” on page 811](#).

| | |
|--------------------------|-----------------------------|
| Key Path | Trace/Detector, Data |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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,

$$\begin{aligned} R_{XX}(\tau) &= I_{FFT} [G_{XX}(f)] \\ &= I_{FFT} [\text{conj}(F[r \times t]) \times F(t)] \end{aligned}$$

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 = $1/2$ width rectangular window
 \times = multiplication

Common Measurement Functions 2
Trace/Detector

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. $c = I(\text{conj}(F\{r\ t\}) F[t])$

Average

Continuous

Peak Hold $c = I(\text{conj}(F\{r\ t\}) F[t])$

Average

Time AC $[n] = I(\text{conj}(F\{r\ AT[n]\}) F(AT[n]))$

Average

where: $AT[n] = \frac{1}{n} \text{sum}(t[n])$

Time

Expon. AC $[n] = I(\text{conj}(F\{r\ AT[n]\}) F(AT[n]))$

Average

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, "Data" on page 811.

| | |
|-------------------------|-----------------------------|
| Key Path | Trace/Detector, Data |
| Mode | VSA |
| Instrument S/W Revision | Prior to A.02.00 |

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM 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) |
| Readback Text | Log Mag (dB) Linear Mag Real (I) Imaginary (Q) I-Q Constellation Wrap Phase Unwrap Phase I-Eye Q-Eye Trellis-Eye Group Delay Log Mag |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM 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? |

Common Measurement Functions 2

Trace/Detector

| | |
|--------------------------|--|
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM 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? |

Common Measurement Functions 2

Trace/Detector

| | |
|--------------------------|----------------------------|
| Preset | SYMB |
| State Saved | Saved in instrument state. |
| Range | sym sec |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM 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 |
| Readback Text | Last: <date_time> Empty |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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 |
| Mode | VSA, LTE, IDEN |
| 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. |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

| | |
|--------------------------|---|
| Key Path | SCPI only |
| Mode | VSA, LTE, IDEN |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

| | |
|--------------------------|---|
| Key Path | SCPI only |
| Mode | VSA, LTE, IDEN |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM 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 | $1E+8$ |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk |
| Remote Command | :DISP:play:<meas>:TRACe[1] 2 3 4:FORMat:PHASe:UNWRap:REFe rence <real> :DISP:play:<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 | $9.9e37$ |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk |

Common Measurement Functions 2

Trace/Detector

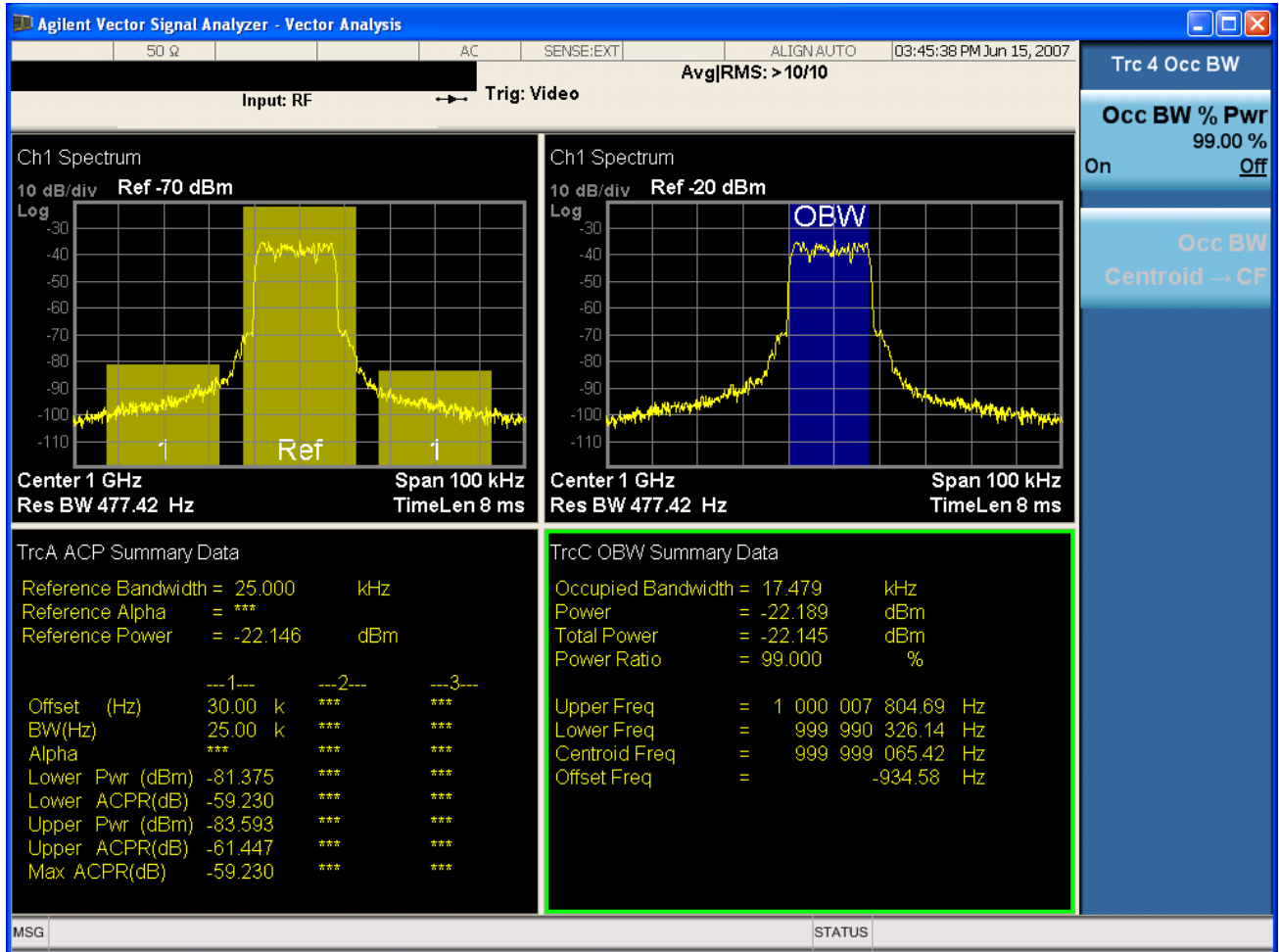
| | |
|--------------------------|---|
| Remote Command | :DISPlay:<meas>:TRACe[1] 2 3 4:FORMat:DELay:APERture <real> :DISPlay:<meas>:TRACe[1] 2 3 4:FORMat:DELay:APERture? |
| Example | DISP:DDEM:TRAC3:FORM:DEL:APER 1 DISP:DDEM:TRAC3:FORM:DEL:APER? |
| Notes | Parameter is interpreted as a percent, e.g., 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Readback Text | [On Off,] |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

ACP Summary for Trace 1

Select trace for assignment of ACP Data.

See also “ACP Setup” on page 834

| Key Path | Trace/Detector, Data, ACP, Channel n |
|----------|--------------------------------------|
|----------|--------------------------------------|

Common Measurement Functions 2

Trace/Detector

| | |
|--------------------------|------------------|
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

ACP Summary for Trace 2

Select trace for assignment of ACP Data.

See also [“ACP Setup” on page 834](#)

| | |
|--------------------------|---|
| Key Path | Trace/Detector, Data, ACP, Channel n |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

ACP Summary for Trace 3

Select trace for assignment of ACP Data.

See also [“ACP Setup” on page 834](#)

| | |
|--------------------------|---|
| Key Path | Trace/Detector, Data, ACP, Channel n |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

ACP Summary for Trace 4

Select trace for assignment of ACP Data.

See also [“ACP Setup” on page 834](#)

| | |
|--------------------------|---|
| Key Path | Trace/Detector, Data, ACP, Channel n |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

ACP On/Off

This softkey turns the ACP function on or off for the selected trace

| | |
|----------|----------------------------|
| Key Path | Trace/Detector, ACP |
| Mode | VSA, LTE, IDEN |

| | |
|--------------------------|---|
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM 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. |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk |
| Remote Command | :CALCulate:<meas>:TRACe[1] 2 3 4:ACPowEr:CARRier:BANDwi dth BWIDth:INTegration <bandwidth> :CALCulate:<meas>:TRACe[1] 2 3 4:ACPowEr:CARRier:BANDwi dth 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Carrier RRC Weighting

This key turns on or off RRC weighting for the reference (carrier) power measurement.

| | |
|-------------------------|--|
| Key Path | Trace/Detector, ACP |
| Mode | VSA, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM 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. |
| Instrument S/W Revision | Prior to A.02.00 |

Modified at S/W Revision A.02.00

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk |
| Remote Command | :CALCulate:<meas>:TRACe[1] 2 3 4:ACPoweR:CARRier:FILTer :RRC:ALPHa <real> :CALCulate:<meas>:TRACe[1] 2 3 4:ACPoweR: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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Common Measurement Functions 2
Trace/Detector

Offset Freq This key turns ACP analysis on or off for a selected offset, and sets the offset frequency (which is relative to the carrier frequency).

| | |
|--------------------------|---|
| Key Path | Trace/Detector,ACP,Offsets,Offset A B C D E |
| Mode | VSA, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk |
| Remote Command | :CALCulate:<meas>:TRACe[1] 2 3 4:ACPoweR:OFFSet:LIST:FREQuency <freq>, ... :CALCulate:<meas>:TRACe[1] 2 3 4:ACPoweR:OFFSet:LIST:FREQuency? :CALCulate:<meas>:TRACe[1] 2 3 4:ACPoweR:OFFSet:LIST:STATe OFF ON 0 1, ... :CALCulate:<meas>:TRACe[1] 2 3 4:ACPoweR:OFFSet:LIST:STATe? |
| Example | CALC:VECT:TRAC1:ACP:OFFS:LIST:FREQ 1 MHZ,1 MHZ,500 KHZ,500 KHZ,1 MHZ CALC:VECT:TRAC1:ACP:OFFS:LIST:FREQ? :CALC:VECT:TRAC1:ACP:OFFS:LIST:STAT ON,OFF,OFF,ON,OFF |
| Notes | If you send fewer than 5 frequencies in the parameter list, then the remaining offsets frequencies are set to 0. You may send a single on/off parameter, or a comma-separated list of up to 5 parameters. These enable/disable each of the Offsets in sequence. Any remaining Offsets are disabled |
| Preset | 3000000,0,0,0,0 1,0,0,0,0 |
| State Saved | Saved in instrument state. |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM 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 |
| Instrument S/W Revision | Prior to A.02.00 |

Common Measurement Functions 2

Trace/Detector

Modified at S/W Revision A.02.00

Offset Relative Limit This key enables you to turn on/off a relative limit test and set the limit for the selected offset. The test shows a failure if the power in either the upper or lower band at the selected offset exceeds the reference power plus the relative test limit. For example, if the test limit is -60 , the reference power is -4.5 dBm, a test failure would be shown if the power in the lower or upper band exceeds -64.5 dBm.

| | |
|--------------------------|--|
| Key Path | Trace/Detector,ACP,Offsets |
| Mode | VSA, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk |
| Remote Command | :CALCulate:<meas>:TRACe[1] 2 3 4:ACP:Power:OFFSet:LIST:RC ARrier <reall>, ... :CALCulate:<meas>:TRACe[1] 2 3 4:ACP:Power:OFFSet:LIST:RC ARrier? :CALCulate:<meas>:TRACe[1] 2 3 4:ACP:Power:OFFSet:LIST:RC ARrier:TEST OFF ON 0 1, ... :CALCulate:<meas>:TRACe[1] 2 3 4:ACP:Power:OFFSet:LIST:RC ARrier:TEST? |
| Example | CALC:VECT:TRAC1:ACP:OFFS:LIST:RCAR -50, -55, -60, -65, -80 CALC:VECT:TRAC1:ACP:OFFS:LIST:RCAR? CALC:VECT:TRAC1:ACP:OFFS:LIST:RCAR:TEST 1, 1, 1, 1, 1 CALC:VECT:TRAC1:ACP:OFFS:LIST:RCAR:TEST? |
| Notes | You may send a single Limit for Offset A, or a comma-separated list of up to 5 limit parameters. These are assigned in sequence to the Offset frequencies, with the remaining limits being set to 0. You may send a single on/off parameter, or a comma-separated list of up to 5 parameters. These turn the Limit Test on or off for each of the Offsets in sequence. For any remaining Offsets the Limit test will be turned off. |
| Preset | -120,-120,-120,-120,-120 0,0,0,0,0 |
| State Saved | Saved in instrument state. |
| Min | 50 |
| Max | -200 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk |
| Remote Command | :CALCulate:<meas>:TRACe[1] 2 3 4:ACPoweR:OFFSet:FILTer: RRC:STATe OFF ON 0 1 :CALCulate:<meas>:TRACe[1] 2 3 4:ACPoweR: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. |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

OBW Setup (Occupied Bandwidth)

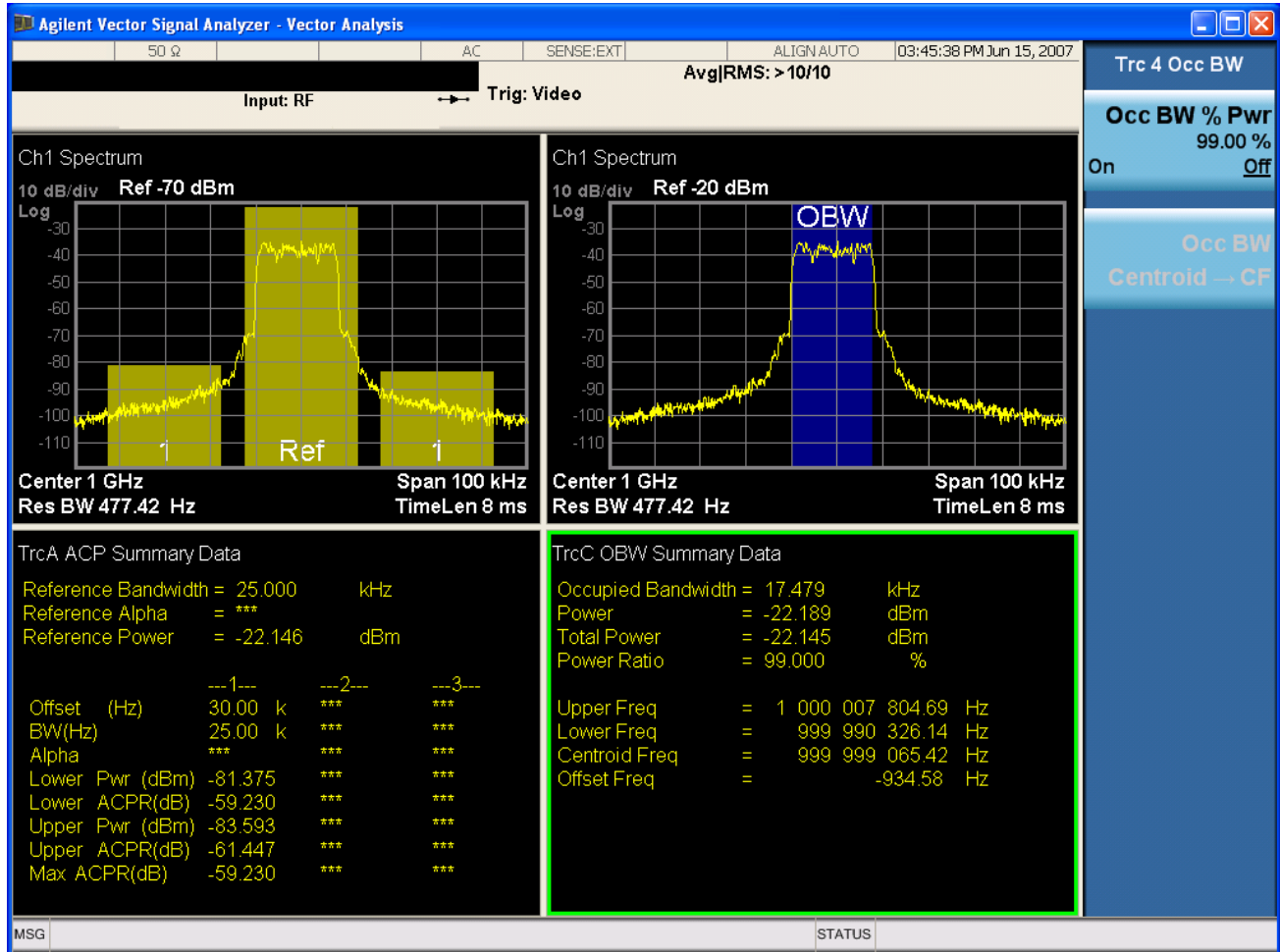
The occupied bandwidth (OBW) function finds and displays the band of frequencies that contain a specified percentage of the total power within the measurement span.

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.

Common Measurement Functions 2

Trace/Detector



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, LTE, IDEN |
| Readback Text | [On Off, <num>%] |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

OBW Summary for Trace 1

Select trace for assignment of OBW Data.

See also: “OBW Setup (Occupied Bandwidth)” on page 843

| Key Path | Trace/Detector, Data, OBW, Channel n |
|----------|--------------------------------------|
|----------|--------------------------------------|

| | |
|--------------------------|------------------|
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

OBW Summary for Trace 2

Select trace for assignment of OBW Data

See also: [“OBW Setup \(Occupied Bandwidth\)” on page 843.](#)

| | |
|--------------------------|---|
| Key Path | Trace/Detector, Data, OBW, Channel n |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

OBW Summary for Trace 3

Select trace for assignment of OBW Data

See also: [“OBW Setup \(Occupied Bandwidth\)” on page 843.](#)

| | |
|--------------------------|---|
| Key Path | Trace/Detector, Data, OBW, Channel n |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

OBW Summary for Trace 4

Select trace for assignment of OBW Data

See also: [“OBW Setup \(Occupied Bandwidth\)” on page 843.](#)

| | |
|--------------------------|---|
| Key Path | Trace/Detector, Data, OBW, Channel n |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |

Common Measurement Functions 2

Trace/Detector

| | |
|--------------------------|---|
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM 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. |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM 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? |
| Preset | 1000000 0 |
| State Saved | Saved in instrument state. |
| Min | 1 Hz |
| Max | 9.9e37 (Infinity) Hz |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Register

Accesses a menu that allows you to select registers for assignment of trace data.

| | |
|----------|-----------------------------|
| Key Path | Trace/Detector, Data |
| Mode | VSA, LTE, IDEN |

Common Measurement Functions 2

Trace/Detector

| | |
|--------------------------|------------------|
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Data 1

Select register 1 for assignment of trace data.

| | |
|--------------------------|---------------------------------------|
| Key Path | Trace/Detector, Data, Register |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Data 2

Selects register 1 for assignment of trace data.

| | |
|--------------------------|---------------------------------------|
| Key Path | Trace/Detector, Data, Register |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Data 3

Selects register 1 for assignment of trace data.

| | |
|--------------------------|---------------------------------------|
| Key Path | Trace/Detector, Data, Register |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Data 4

Selects register 1 for assignment of trace data.

| | |
|--------------------------|---------------------------------------|
| Key Path | Trace/Detector, Data, Register |
| Mode | VSA, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Data 5

Selects register 5 for assignment of trace data.

| | |
|--------------------------|---------------------------------------|
| Key Path | Trace/Detector, Data, Register |
| Mode | VSA |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Data 6

Selects register 6 for assignment of trace data.

| | |
|--------------------------|---------------------------------------|
| Key Path | Trace/Detector, Data, Register |
| Mode | VSA |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |

Common Measurement Functions 2

Trigger

Modified at S/W Revision A.02.00

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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,Video |
| Mode | VSA, LTE, IDEN |
| 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 10 MS TRIG:VID:DEL? TRIG:VID:DEL:STAT ON TRIG:VID:DEL:STAT? |
| Notes | :TRIGger[:SEquence]:IF:DELay <time> may be used as an alias :TRIGger[:SEquence]:IF:DELay:STATe may also be used as an alias |
| Preset | 0 OFF |
| State Saved | Saved in instrument state. |
| Min | -9.9E+37 |
| Max | 9.9E+37 |

Common Measurement Functions 2

Trigger

Instrument S/W Revision Prior to A.02.00
 Modified at S/W Revision A.02.00

Trig Holdoff Sets the trigger holdoff time.

| | |
|--------------------------|--|
| Key Path | Trigger,Video |
| Mode | VSA, LTE, IDEN |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, LTE, IDEN |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |

Common Measurement Functions 2

Trigger

| | |
|--------------------------|---|
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Trig Holdoff Sets the trigger holdoff time.

| | |
|--------------------------|--|
| Key Path | Trigger, External 1 |
| Mode | VSA, LTE, IDEN |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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.

Common Measurement Functions 2

Trigger

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, IDEN |
| 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 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |

IF Envelope

Pressing this key 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, IDEN |

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.

Note: Holdoff conditions must also be met.

| | |
|----------------|---|
| Key Path | Trigger, IF Envelope |
| Mode | VSA, LTE, IDEN |
| 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 |

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, IDEN |
| 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 |

Common Measurement Functions 2

Trigger

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,Video |
| Mode | VSA, LTE, IDEN |
| Remote Command | :TRIGger[:SEquence]:RECORDing:VIDeo:DELay <time> :TRIGger[:SEquence]:RECORDing:VIDeo:DELay? :TRIGger[:SEquence]:RECORDing:VIDeo:DELay:STATe OFF ON 0 1 :TRIGger[:SEquence]:RECORDing:VIDeo:DELay:STATe? |
| Example | TRIG:REC:VID:DEL 10 MS TRIG:REC:VID:DEL? TRIG:REC:VID:DEL:STAT ON TRIG:REC:VID:DEL:STAT? |
| Notes | :TRIGger[:SEquence]:RECORDing:IF:DELay <time> may be used as an alias :TRIGger[:SEquence]:RECORDing:IF:DELay:STATe may be used as an alias |
| Preset | 0 0 |
| State Saved | Saved in instrument state. |
| Min | -9.9E+37 |
| Max | 9.9E+37 |

Trig Holdoff Sets the trigger holdoff time.

| | |
|----------------|---|
| Key Path | Trigger,Video |
| Mode | VSA, LTE, IDEN |
| Remote Command | :TRIGger[:SEquence]:RECORDing:VIDeo:HOLDoff <time> :TRIGger[:SEquence]:RECORDing:VIDeo:HOLDoff? :TRIGger[:SEquence]:RECORDing:VIDeo:HOLDoff:STATe OFF ON 0 1 :TRIGger[:SEquence]:RECORDing:VIDeo:HOLDoff:STATe? |
| Example | TRIG:REC:VID:HOLD 1 US TRIG:REC:VID:HOLD? TRIG:REC:VID:HOLD:STAT ON TRIG:REC:VID:HOLD :STAT? |

| | |
|-------------|--|
| Notes | :TRIGger[:SEQuence]:RECOrding:IF:HOLDoff may be used as an alias :TRIGger[:SEQuence]:RECOrding:IF:HOLDoff:STATe may be used as an alias |
| Preset | 0 0 |
| State Saved | Saved in instrument state. |
| Min | -9.9E+37 |
| Max | 9.9E+37 |

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, LTE, IDEN |
| Remote Command | :TRIGger[:SEQuence]:RECOrding:VIDeo:HOLDoff:TYPE BELOW ABOVE :TRIGger[:SEQuence]:RECOrding:VIDeo:HOLDoff:TYPE? |
| Example | TRIG:REC:VID:HOLD:TYPE BEL TRIG:REC:VID:HOLD:TYPE? |
| Notes | :TRIGger[:SEQuence]:RECOrding:IF:HOLDoff:TYPE can be used as an alias |
| Preset | BEL |
| State Saved | Saved in instrument state. |
| Range | Below Level Above Level |

Baseband

Pressing this key, when it is not selected, selects Baseband triggering. It is equivalent to oscilloscope triggering.

Common Measurement Functions 2

Trigger

Note: This trigger type is most useful with recorded data that is real (baseband). It is allowed (though not very useful) when the data is complex. In this case the only the real part of the data is used to calculate the trigger condition.

The trigger condition is met when the signal (or the real part of the complex signal) crosses the defined trigger level while satisfying the slope and holdoff conditions. The measurement starts at the trigger point plus the Trigger Delay. Note that the trigger delay may be negative, causing the measurement to start before the trigger point.

If Level triggering is already selected then pressing this softkey accesses the trigger setup functions, and changes the active function to Level Trigger Level.

| | |
|----------|----------------|
| Key Path | Trigger |
| Mode | VSA, LTE, IDEN |

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, Threshold |
| Mode | VSA, LTE, IDEN |
| Remote Command | :TRIGger[:SEQuence]:RECORDing:BASEband:LEVel <voltage> :TRIGger[:SEQuence]:RECORDing:BASEband:LEVel? |
| Example | TRIG:REC:BAS:LEV 10 MV TRIG:REC:BAS:LEV? |
| Preset | 0 V |
| State Saved | Saved in instrument state. |
| Min | -9.9E+37 |
| Max | 9.9E+37 |

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, Threshold |
| Mode | VSA, LTE, IDEN |
| Remote Command | :TRIGger[:SEQuence]:RECORDing:BASEband:SLOPe POSitive NEGative :TRIGger[:SEQuence]:RECORDing:BASEband:SLOPe? |
| Example | TRIG:REC:BAS:SLOP POS TRIG:REC:BAS:SLOP? |
| Preset | POS |

State Saved Saved in instrument state.
 Range Pos | Neg

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, Threshold |
| Mode | VSA, LTE, IDEN |
| Remote Command | :TRIGger[:SEquence]:RECORDing:BASEband:DELay <time> :TRIGger[:SEquence]:RECORDing:BASEband:DELay? :TRIGger[:SEquence]:RECORDing:BASEband:DELay:STATe OFF ON 0 1 :TRIGger[:SEquence]:RECORDing:BASEband:DELay:STATe? |
| Example | TRIG:REC:BAS:DEL 10 MS TRIG:REC:BAS:DEL? TRIG:REC:BAS:DEL:STAT ON TRIG:REC:BAS:DEL:STAT? |
| Preset | 0 0 |
| State Saved | Saved in instrument state. |
| Min | -9.9E+37 |
| Max | 9.9E+37 |

Trig Holdoff Sets the trigger holdoff time.

| | |
|----------------|--|
| Key Path | Trigger, Threshold |
| Mode | VSA, LTE, IDEN |
| Remote Command | :TRIGger[:SEquence]:RECORDing:BASEband:HOLDoff <time> :TRIGger[:SEquence]:RECORDing:BASEband:HOLDoff? |
| Example | TRIG:REC:BAS:HOLD 1 US TRIG:REC:BAS:HOLD? TRIG:REC:BAS:HOLD:STAT ON TRIG:REC:BAS:HOLD:STAT? |
| Preset | 0 0 |
| State Saved | Saved in instrument state. |

Common Measurement Functions 2

Trigger

| | |
|-----|----------|
| Min | -9.9E+37 |
| Max | 9.9E+37 |

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, Threshold |
| Mode | VSA, LTE, IDEN |
| Remote Command | :TRIGger[:SEQuence]:RECOrding:BASEband:HOLDoff:TYPE BELow ABOVE :TRIGger[:SEQuence]:RECOrding:BASEband:HOLDoff:TYPE? |
| Example | TRIG:REC:BAS:HOLD:TYPE BEL TRIG:REC:BAS:HOLD:TYPE? |
| Preset | BEL |
| State Saved | Saved in instrument state. |
| Range | Below Level Above Level |

View/Display

The View/Display menu contains the Display branch key, which allows you to set many display properties. Many View Preset softkeys appear under this menu. These set up measurement-specific views, which are described in individual measurements. 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, IDEN |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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.

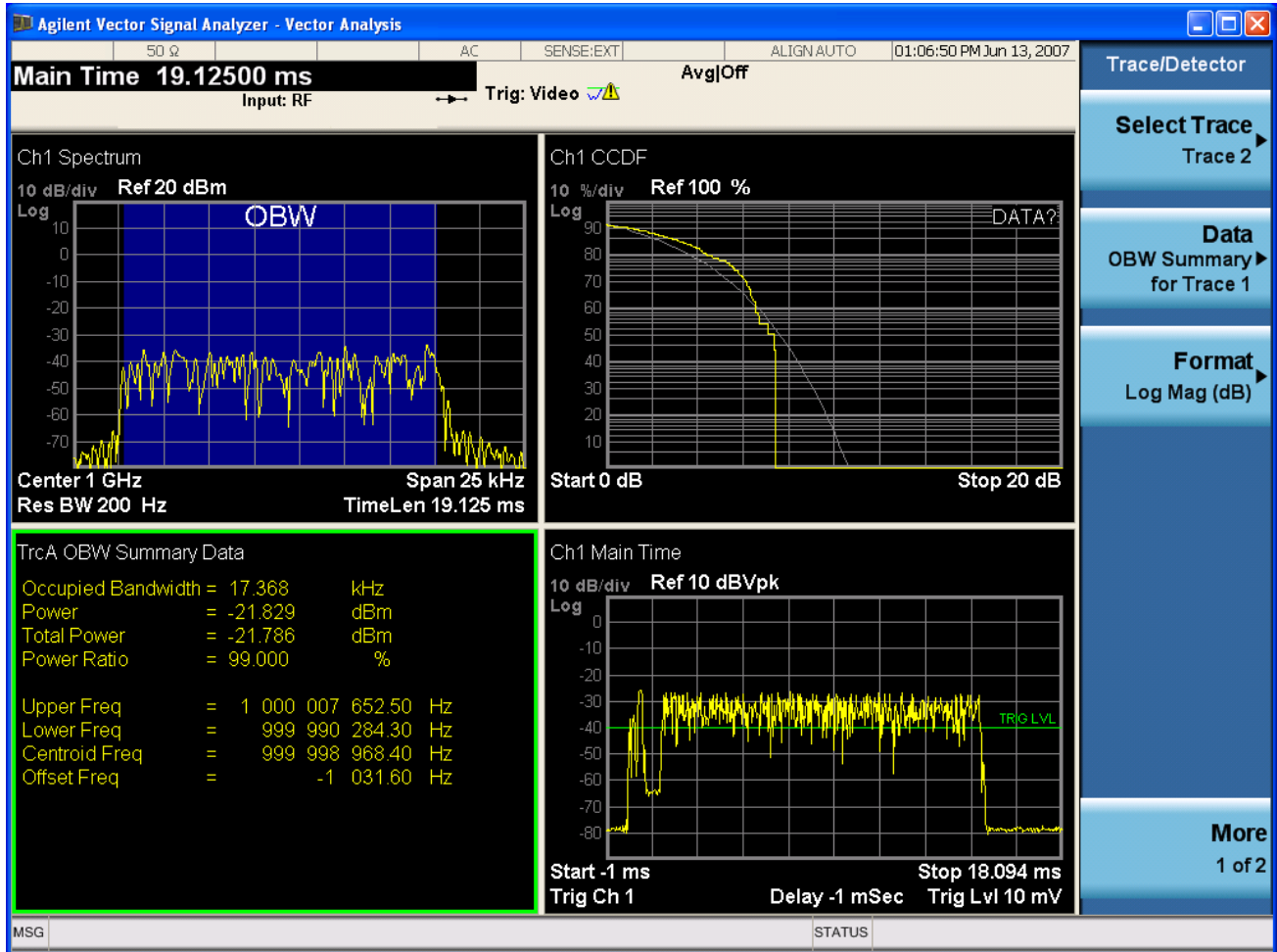
Stack 2 layout has two windows, one on top of the other, that display either traces 1 (top) and 2 (bottom) or traces 3 and 4. The pair that is showing always includes the selected trace.

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.

Common Measurement Functions 2

View/Display

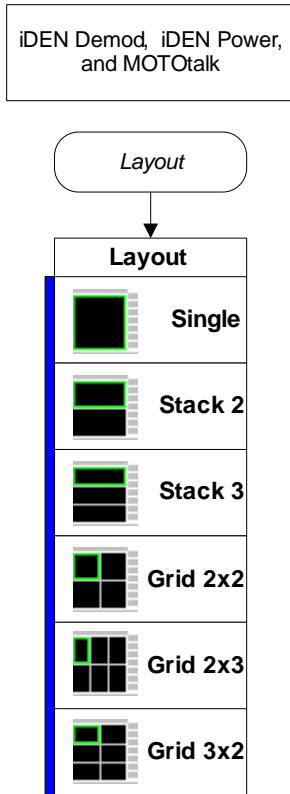


Grid 2x2 layout with Trace 2 selected

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, then left to right.

Grid 3x2 layout has 3 rows of 2 windows that display all 6 traces in order, top to bottom, then left to right.



| | |
|------------------------|--|
| Key Path | View/Display |
| Mode | VSA, LTE, IDEN |
| 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? For iDEN Power, iDEN Demod and MotoTalk measurements: :DISPlay:<meas>:WINDow:FORMat SINGLE TWO TRI QUAD GR2X3 GR3X2 :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. |

Common Measurement Functions 2

View/Display

| | |
|--------------------------|---|
| Range | Single Stack 2 Stack 3 Grid 2x2 Grid 2x2 Grid 2x3 Stack 3 |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Remote SCPI Commands and Data Queries

Remote SCPI Results described in this section include:

“:READ and :FETCh Commands” on page 869

“:CALCulate:DATA” on page 872

“:CALCulate:DATA:RAW” on page 873

“:CALCulate:DATA:RAW:COMPLex” on page 874

“:CALCulate:DATA:POINts commands” on page 874

“:CALCulate:DATA:TABL commands” on page 875

“:CALCulate:DATA:HEADer commands” on page 879

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 and :FETCh Commands

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 |
|-----------|---|------------------|
|-----------|---|------------------|

Common Measurement Functions 2

Remote SCPI Commands and Data Queries

| | | |
|---|-------------------------|---|
| Mode = VSA LTE IDEN | Not specified or n=1 | <p>Reserved for selected results of VSA measurements.</p> <p>If not used for a particular measurement, no result is returned and error -114 Header suffix out of range is generated</p> |
| Mode = VSA LTE IDEN | 2 – 50 | <p>Reserved for selected results of VSA measurements.</p> <p>If not used for a particular measurement, no result is returned and error -114 Header suffix out of range is generated</p> |
| Mode = VSA LTE IDEN, 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 <p>29. Overall ACP test result summary (0 indicates at least 1 failure, 1 indicates all passed)</p> <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 IDEN, ACP on trace 2 | 52 | ACP Summary for trace 2 see list for trace 1 summary |
| Mode = VSA LTE IDEN, ACP on trace 3 | 53 | ACP Summary for trace 3 see list for trace 1 summary |
| Mode = VSA LTE IDEN, ACP on trace 4 | 54 | ACP Summary for trace 4 see list for trace 1 summary |
| Mode = VSA LTE IDEN, ACP on trace 5 | 55 | ACP Summary for trace 5 see list for trace 1 summary |
| Mode = VSA LTE IDEN, 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 IDEN, 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: 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 IDEN, OBW on trace 2 | 62 | OBW Summary for trace 2 see list for trace 1 summary |
| Mode = VSA LTE IDEN, OBW on trace 3 | 63 | OBW Summary for trace 3 see list for trace 1 summary |
| Mode = VSA LTE IDEN, OBW on trace 4 | 64 | OBW Summary for trace 4 see list for trace 1 summary |

Common Measurement Functions 2

Remote SCPI Commands and Data Queries

Mode = VSA | 65 OBW Summary for trace 5
LTE | IDEN,
OBW on trace
5 see list for trace 1 summary

Mode = VSA | 66 OBW Summary for trace 6
LTE | IDEN,
OBW on trace
6 see list for trace 1 summary

| | |
|----------|----------------------------|
| Key Path | Remote Command Only |
| Mode | LTE, IDEN, VSA |

: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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWER IDEMod MOtalk |
| Remote Command | :CALCulate:<meas>:DATA[1] 2 3 4? [Y X XY[,OFF ON 0 1]] |
| Example | CALC:VECT:DATA1? CALC:VECT:DATA1? Y,ON CALC:VECT:DATA1? X CALC:VECT:DATA1? XY |
| 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> |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

:CALCulate:DATA:RAW

Retrieves trace data in its underlying units, before the formatting calculation that converts it to displayed

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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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer 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. |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

: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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer 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. |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

: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, IDEN |
|------|----------------|

| | |
|--------------------------|--|
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk |
| Remote Command | :CALCulate:<meas>:DATA[1] 2 3 4:POINTs? [OFF ON 0 1] |
| Example | CALC:VECT:DATA1:POINTs? |
| Notes | Query only. 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 Note that this is points, not array size. If the XY parameter is included, there are 2 numbers returned per point. (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). |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer IDEMod MOTotalk |
| Remote Command | :CALCulate:<meas>:DATA[1] 2 3 4:RAW:POINTs? |
| Example | CALC:VECT:DATA1:RAW:POINTs? |
| Notes | Query only. |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

: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 |
|---------|---------|---------|
|---------|---------|---------|

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| | | |
|--|--|---------------------------------|
| 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:NAMes? | Comma-separated list of all table data names | CALC:DDEM:DATA4:TABL:NAM? |
| CALCulate:<meas>:DATA<n>:TABLe:UNIT? | Comma-separated list of all table data units | CALC:DDEM:DATA4:TABL:UNIT? |

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer 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. The returned results are in numeric format, under control of the FORMat[:TRACe][:DATA] command. For table data that is non-numeric, NaN is returned. To get the value of these data, use the CALC:<meas>:DATA2:TABL:STR? command |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Some tables have string data. The above Trace Table Data query cannot return it, and sends NaN in its place. Here is a form of Trace Table Data query that can return string data from tables.

| | |
|--------------------------|---|
| Mode | VSA, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWER IDEMod MOTotalk |
| Remote Command | :CALCulate:<meas>:DATA[1] 2 3 4:TABLE:STRing? [<string>] |
| Example | CALC:DDEM:DATA2:TABL:STR? "Obw" |
| Notes | Query only. If sent without a string specifier, this returns the entire table for the designated trace, in comma-separated format. 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. |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

The following query returns a comma-separated list of 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 Trace Table Data commands. The names appear in the same order as the corresponding data values returned by the CALC:<meas>:DATA<n>:TABL[:NUMB|STR]? query.

| | |
|----------------|---|
| Mode | VSA, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWER IDEMod MOTotalk |
| Remote Command | :CALCulate:<meas>:DATA[1] 2 3 4:TABLE:NAMes? |

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| | |
|--------------------------|--|
| 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. |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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 corresponding data values returned by the CALC:<meas>:DATA<n>:TABL[:NUMB|STR]? query.

| | |
|--------------------------|---|
| Mode | VSA, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer 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. |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

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. The headers have a name and a value that can be obtained from any trace by using the CALCulate:<meas>:DATA:HEADer commands described in this section.

The following Remote Commands are described in this section:

[“Query Header Names” on page 879](#)

[“Query Header Type” on page 880](#)

[“Numeric Header by Name Returned as String” on page 880](#)

[“Numeric Header by Name Returned per Form Command ” on page 881](#)

[“Test Limits Pass or Fail” on page 881](#)

Query Header Names

The following query returns a comma-separated list of all the header names associated with the

Common Measurement Functions 2

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designated trace. Each of the 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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer 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. |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Query Header Type

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer 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. |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Numeric Header by Name Returned as String

This query gets a header by name from the designated trace and returns it as a string.

| | |
|----------------|---|
| Mode | VSA, LTE, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWer 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.. |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Numeric Header by Name Returned per Form Command

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, IDEN |
| Measurement | <meas>:=VECTor ADEMod DDEMod W11A W11B EVM IPOWER 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> |
| Instrument S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Test Limits Pass or Fail

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.