



# **Agilent X-Series Signal Analyzer**

**This manual provides documentation for the  
following X-Series Analyzers:  
MXA Signal Analyzer N9020A  
EXA Signal Analyzer N9010A**

## **N9063A Analog Demod Measurement Application User's and Programmer's Reference**



**Agilent Technologies**

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| [[:SENSe]:FM:DEEMphasis OFF US25 US50 US75 US750]         | 359 |

---

## List of Commands

|   |     |
|---|-----|
| [[:SENSe]:FM:DEEMphasis? . . . . .                                  | 359 |
| [[:SENSe]:FREQuency:CENTer <freq> . . . . .                         | 273 |
| [[:SENSe]:FREQuency:CENTer:STEP:AUTO OFF ON 0 1 . . . . .           | 274 |
| [[:SENSe]:FREQuency:CENTer:STEP:AUTO? . . . . .                     | 274 |
| [[:SENSe]:FREQuency:CENTer:STEP[:INCRement] <freq> . . . . .        | 274 |
| [[:SENSe]:FREQuency:CENTer:STEP[:INCRement]? . . . . .              | 274 |
| [[:SENSe]:FREQuency:CENTer? . . . . .                               | 273 |
| [[:SENSe]:POWer[:RF]:ATTenuation <rel_amp!> . . . . .               | 259 |
| [[:SENSe]:POWer[:RF]:ATTenuation? . . . . .                         | 259 |
| [[:SENSe]:POWer[:RF]:GAIN:BAND LOW FULL . . . . .                   | 263 |
| [[:SENSe]:POWer[:RF]:GAIN:BAND? . . . . .                           | 263 |
| [[:SENSe]:POWer[:RF]:GAIN[:STATe] OFF ON 0 1 . . . . .              | 262 |
| [[:SENSe]:POWer[:RF]:GAIN[:STATe]? . . . . .                        | 262 |
| [[:SENSe]:RECORDing:ABORT . . . . .                                 | 303 |
| [[:SENSe]:RECORDing:INITiate[:IMMediate] . . . . .                  | 303 |
| [[:SENSe]:RECORDing:LENGth <real>,SECOnds RECOrds POINts . . . . .  | 304 |
| [[:SENSe]:RECORDing:LENGth:STATe MAX MANual . . . . .               | 304 |
| [[:SENSe]:RECORDing:LENGth:STATe? . . . . .                         | 304 |
| [[:SENSe]:RECORDing:LENGth:UNIT? . . . . .                          | 305 |
| [[:SENSe]:RECORDing:LENGth:VALue? . . . . .                         | 304 |
| [[:SENSe]:ROSCillator:COUPLing NORMal NACQuisition . . . . .        | 319 |
| [[:SENSe]:ROSCillator:COUPLing? . . . . .                           | 319 |
| [[:SENSe]:ROSCillator:EXTernal:FREQuency <freq> . . . . .           | 317 |
| [[:SENSe]:ROSCillator:EXTernal:FREQuency? . . . . .                 | 317 |
| [[:SENSe]:ROSCillator:SOURce INTernal EXTernal . . . . .            | 316 |
| [[:SENSe]:ROSCillator:SOURce:TYPE INTernal EXTernal SENSe . . . . . | 315 |
| [[:SENSe]:ROSCillator:SOURce:TYPE? . . . . .                        | 315 |
| [[:SENSe]:ROSCillator:SOURce? . . . . .                             | 315 |
| [[:SENSe]:SPEaker[:STATe] ON OFF 1 0 . . . . .                      | 361 |
| [[:SENSe]:SPEaker[:STATe]? . . . . .                                | 361 |



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 45](#).

---

See [“Navigating the Help Window Without a Mouse” on page 50](#) 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 60](#).

See [“Navigating the Help Window with a Mouse” on page 49](#) 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 39](#).

To locate **Other Available Help Resources**, see [“Locating Other Help Resources” on page 38](#).

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.

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 55.

## 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                             | <b>HTML Help Format (CHM Files)</b>  | <b>Acrobat Format (PDF Files)</b>   |
|---|--|---|
| 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   |

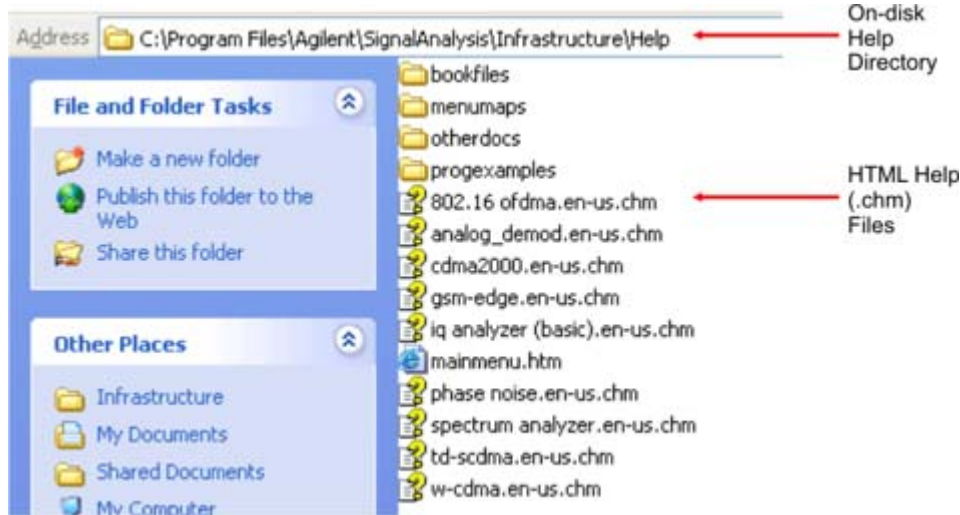
### Copying the HTML Help (CHM) Files

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.




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

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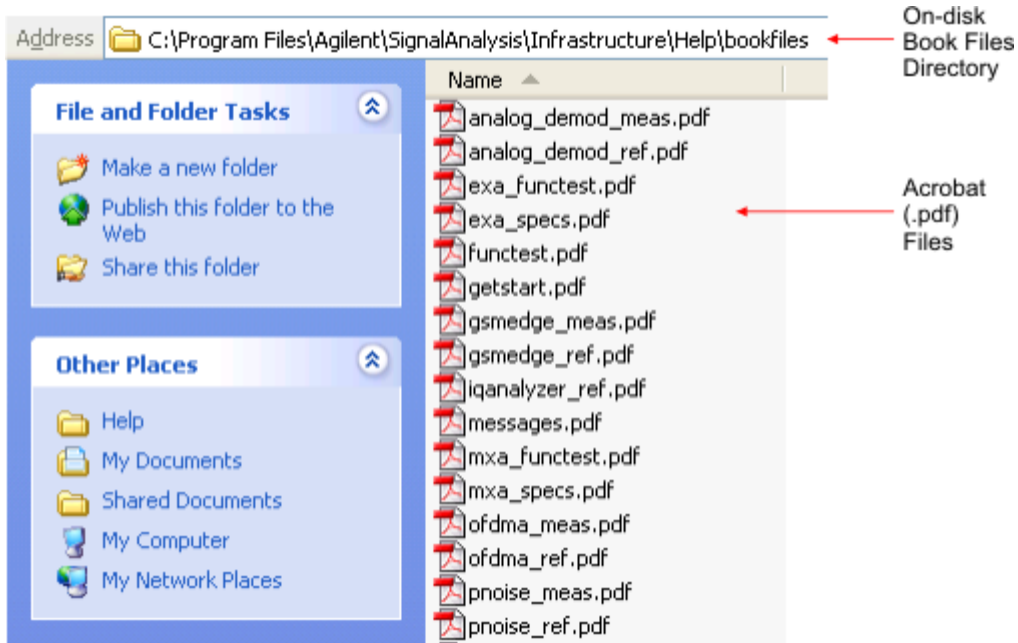
## Copying the Acrobat (PDF) Files

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.





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## How Help is Organized

This topic contains the following sections:

“Help Contents Listing” on page 42

“System Functions” on page 43

“Key Descriptions for Each Measurement” on page 43

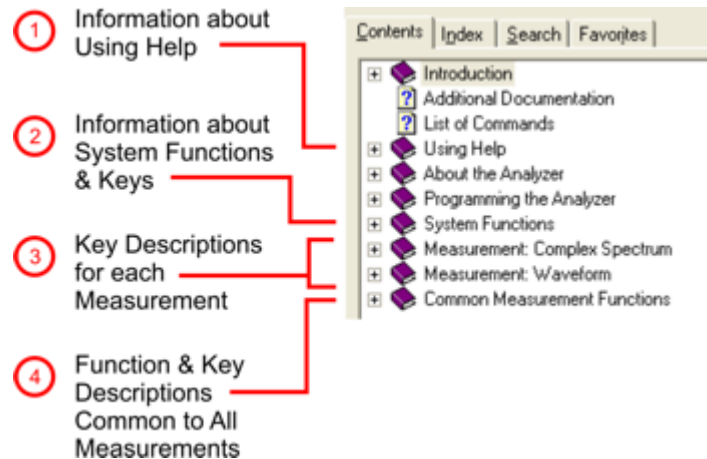
“Key Information for Softkeys” on page 44

“Common Measurement Functions” on page 44

### 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 for the HTML Help version of the document. The structure of the PDF version is similar.



Help information is split between these sections as follows:

1. Using Help: this section.
2. System Functions. See “System Functions” on page 43 below.
3. Measurement Functions. See “Key Descriptions for Each Measurement” on page 43 below.
4. Common Measurement Functions. See “Common Measurement Functions” on page 44 below.

## System Functions

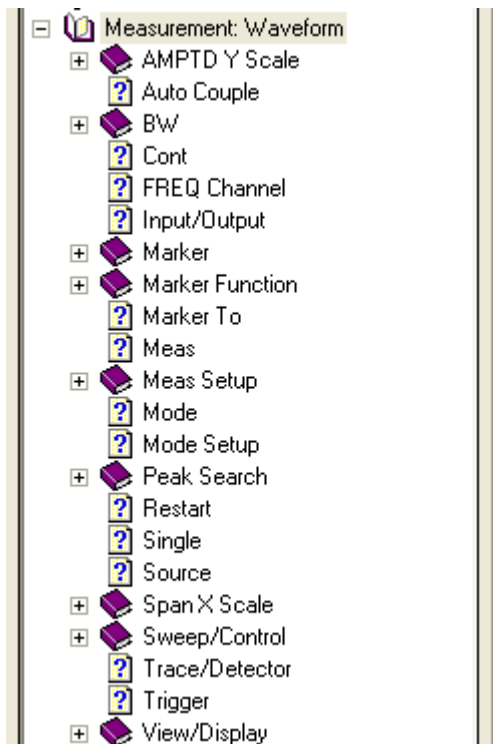
This section contains information for the following keys, which are listed in alphabetical order: **File**, **Preset**, **Print**, **Quick Save**, **Recall**, **Save**, **System**, **User Preset**.

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 44, and are included here for convenience.

## Key Descriptions for Each Measurement

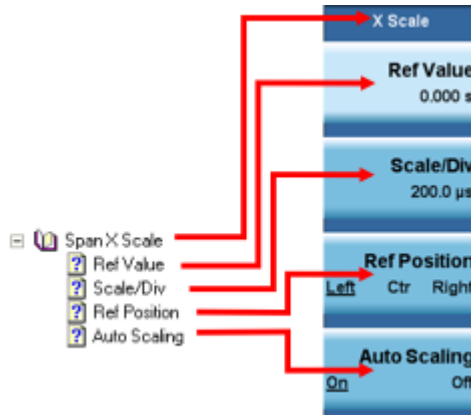
The Contents section for each Measurement is sub-divided into topics for each Front-panel key, in alphabetical order, as shown below.



If you do not see a topic for a front-panel key in the Measurement-specific section, then it is located in the section “[System Functions](#)” on page 43.

## Key Information for Softkeys

Information for each softkey that appears when you press a Front-panel key (or a softkey with a submenu) is listed under the entry for that key in the Help Contents. The example below shows the submenu under the **SPAN X Scale** Front-panel key in the "Waveform" Measurement, alongside the actual softkeys for that menu.



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

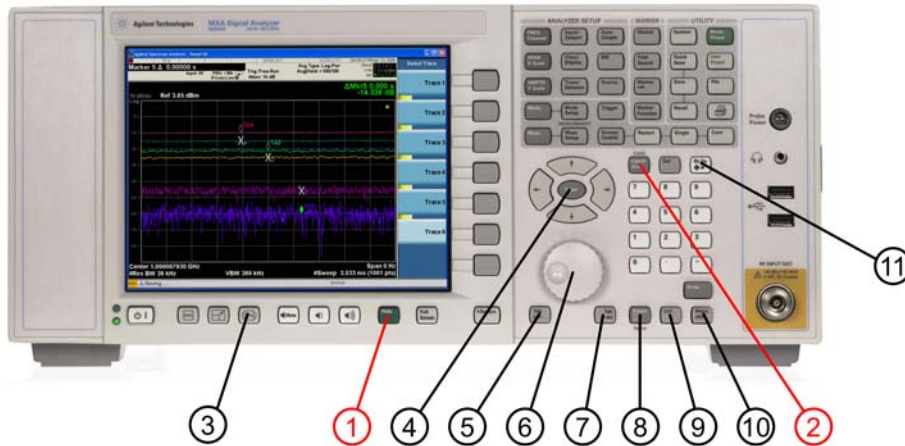
## Common Measurement Functions

This section groups together function and key information that is shared between measurements. However, there is a listing for every front-panel key and sub-key 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.

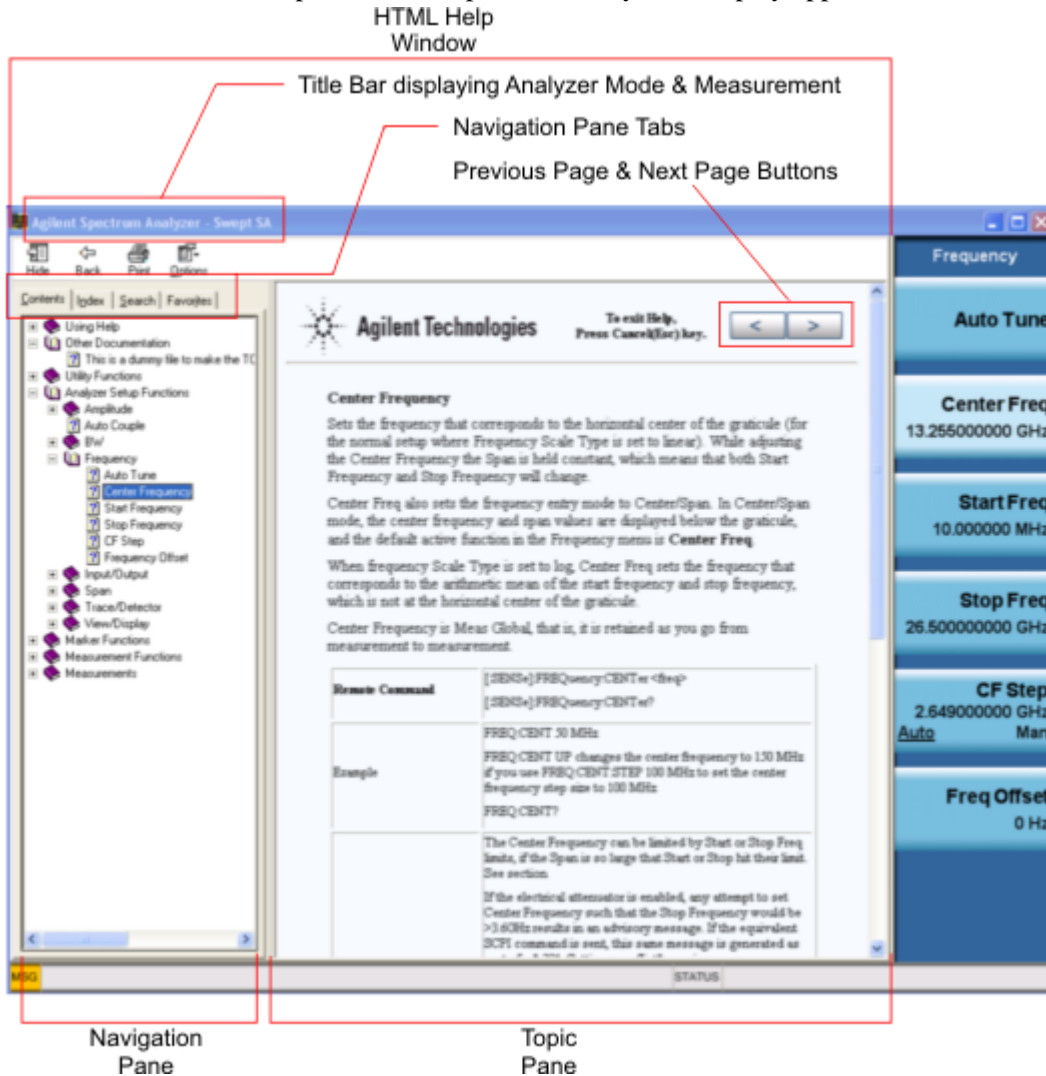


| #  | Item Name             | Description  |
|----|-----------------------|--|
| 1  | Help Key              | Opens Help (displaying the topic for the last key pressed).  |
| 2  | Cancel (Esc) Key      | Exits Help.  |
| 3  | Next Window Key       | Changes the current window pane selection.   |
| 4  | Arrow / Enter Keys    | A central <b>Enter</b> 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 <a href="#">“Navigating Windows HTML Help (CHM) Files”</a> on page 46. |
| 10 | Alt Key               | Navigates within the Help system, in conjunction with other keys. See <a href="#">“Navigating Windows HTML Help (CHM) Files”</a> on page 46. |
| 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 51](#).

### 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” on page 47](#)

[“Getting Help for a Specific Key” on page 48](#)

[“Closing the Help Window” on page 48](#)

[“Viewing Help on How to Use Help” on page 48](#)

[“Exiting Help on How to Use Help” on page 48](#)

To locate the keys mentioned in this section, see [“Front Panel Keys used by the Help System” on page 45](#).

### 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 48), then press the key, before opening Help again (if required).

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

For details of how to navigate within the panes of the Help window, see "Navigating Windows HTML Help (CHM) Files" on page 46.

## 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 53 for details of several methods to accomplish this.



## Navigating the Help Window

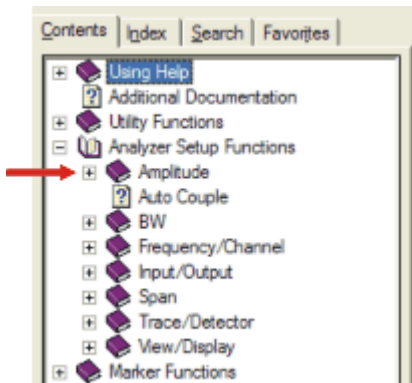
The way you navigate around the HTML Help Window depends on whether you have a mouse and keyboard attached to your Analyzer:

- If you have a mouse and keyboard attached, see the Section “[Navigating the Help Window with a Mouse](#)” on page 49.
- If you don’t have a mouse and keyboard attached, see the Section “[Navigating the Help Window Without a Mouse](#)” on page 50.

### 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 47, 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.



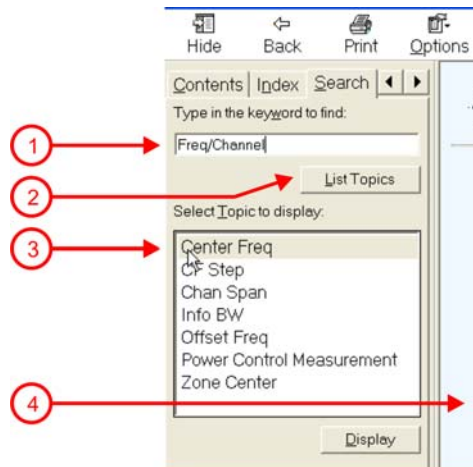
- To move to the Next or Previous Page within the Topic Pane, click the **Next Page** or **Previous Page** Keys (at the top right of the *Topic* Pane), as shown below.



## 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 54.](#)

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” on page 51](#)

[“To Switch the Active Tab within the Navigation Pane” on page 51](#)

[“To Scroll up or down the list of Topics within the Contents or Index Tabs of the Navigation Pane” on page 51](#)

[“To Expand or Collapse a selected topic within the Contents Tab of the Navigation Pane” on page 51](#)

[“To Display a selected Help topic in the Topic Pane from the Contents Tab of the Navigation Pane” on page 52](#)

“To Display a Help topic in the Topic Pane from the Index Tab of the Navigation Pane” on page 52

“To Scroll up or down within a topic in the Topic Pane” on page 52

“To Go to the Next or Previous Page in the Topic Pane” on page 52

“To Go Back or Forward: display the Previously-viewed or Next-viewed Topic in the Topic Pane” on page 53

“To Scroll horizontally or vertically within the Contents Tab of the Navigation Pane” on page 53

“To Print the topic currently displayed” on page 54

To locate all the keys mentioned in this section, see “Front Panel Keys used by the Help System” on page 45.

### To Toggle the Focus between the Navigation Pane and the Topic Pane

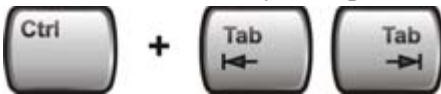
Press the **Next Window** key.



### To Switch the Active Tab within the Navigation Pane

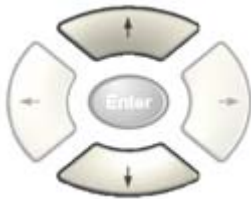
Perform this procedure to display either the Contents, Index, Search or Favorites tab of the Help window’s Navigation Pane.

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



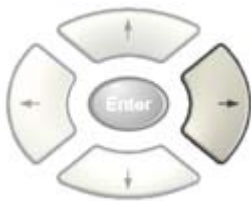
### To Scroll up or down the list of Topics within the Contents or Index Tabs of the Navigation Pane

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:

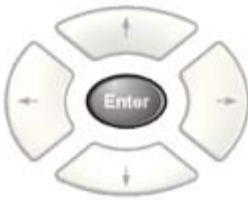


Or press the **Left Arrow** key to *collapse* the selected topic.



### 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.



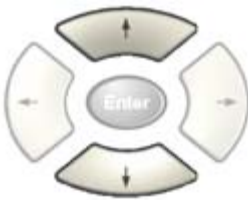
### To Display a Help topic in the Topic Pane from the Index Tab of the Navigation Pane

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.



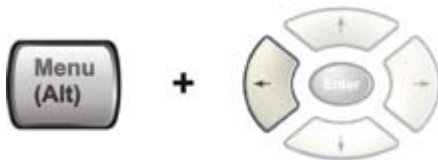
Press **Enter**.



**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.

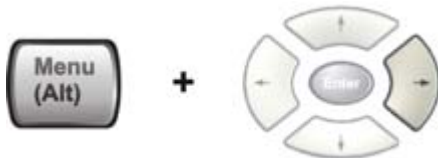


Or:

Press the **Bk Sp** key.



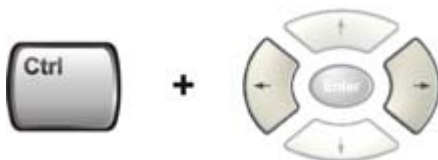
To go forward, hold down the **Alt** key, then press the **Right Arrow** key.



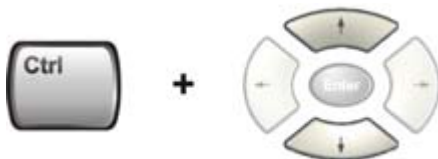
(The "Go Forward" operation has no effect unless there have been previous "Go Back" operations)

**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.

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## Navigating Acrobat (PDF) Files

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

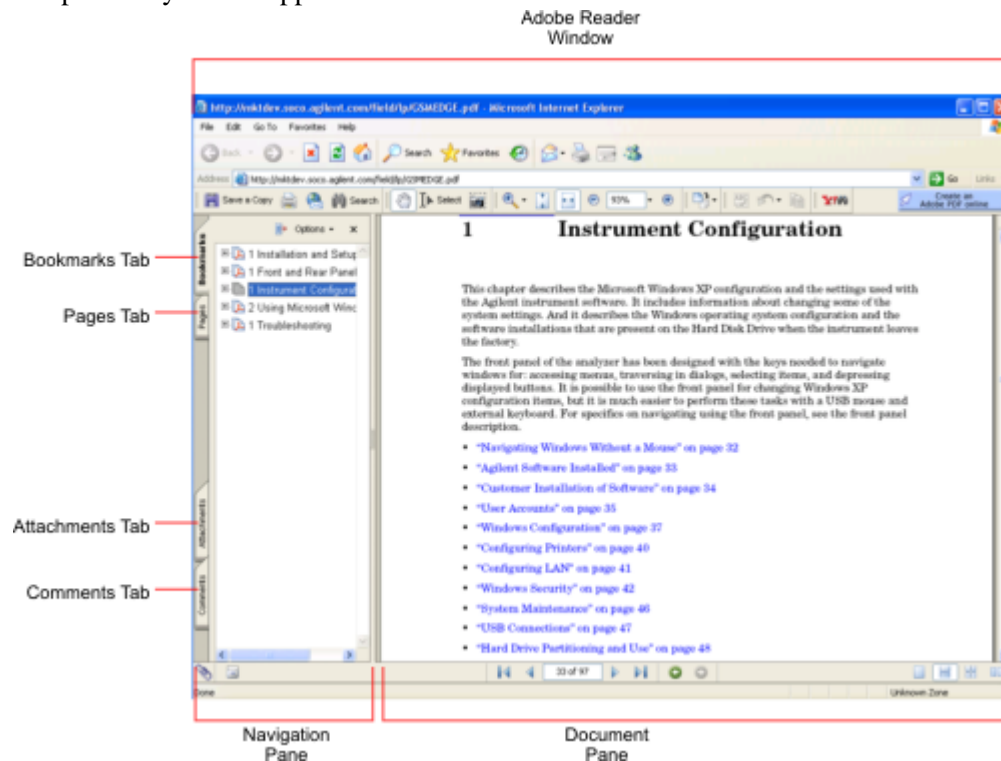
If it is not possible to attach a mouse and keyboard to the Analyzer, you should copy the PDF file to a separate computer, then open it on that computer. Every PDF file that is present on the Analyzer’s hard disk can also be found on the Documentation CD shipped with the Analyzer. For details, see [“Copying the Acrobat \(PDF\) Files”](#) on page 40.

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### 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.

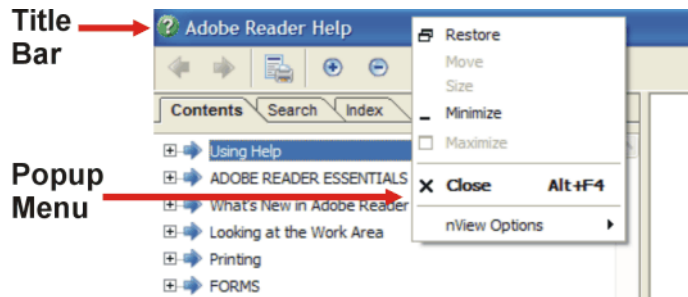
## Navigating the Acrobat Reader Window

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.

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

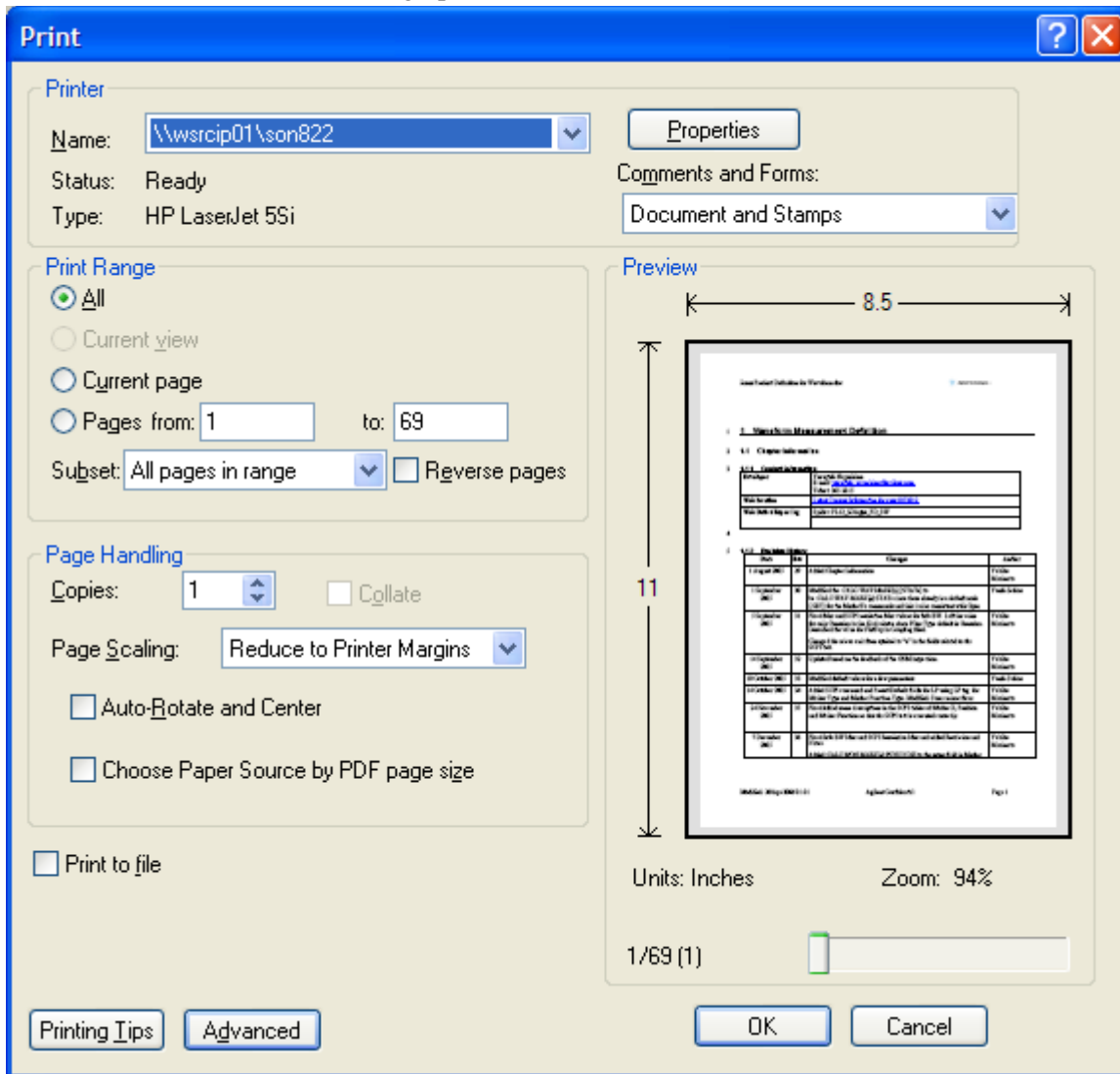
1. *Either*,
  - a. click on the Print icon in the Acrobat Reader toolbar,



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



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



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

**NOTE**

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

## Terms Used in This Documentation

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

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

### Terms used in Key Parameter Tables

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

| Term                       | Meaning   |
|----------------------------|---|
| Default Unit               | The default measurement unit of the setting.  |
| Default Terminator         | Indicates the units that will be attached to the numeric value that you have entered. This default will be used from the front panel, when you terminate your entry by pressing the <b>Enter</b> 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/<br>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 <b>Factory Preset</b> .   |
| 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.  |

| <b>Term</b>                       | <b>Meaning</b>  |
|-----------------------------------|---|
| 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 <b>Power On Last State</b> or <b>User Preset</b> . |

## 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 50](#).
- If your Analyzer does *not* have an attached Mouse and Keyboard, see the Section [“Finding a Topic without a Mouse and Keyboard” on page 60](#) 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” on page 61](#) below.

**TIP** If you want to understand the organization of Help, see the Section [“How Help is Organized” on page 42](#).





### 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 <b>Next Window</b> 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 <b>Up Arrow</b> or <b>Down Arrow</b> keys. Topics become highlighted upon selection.</p>   |  |
| <p>3. Display the selected topic, by pressing the <b>Enter</b> 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 <b>Next Window</b> 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 <b>Forward Tab</b> and <b>Backward Tab</b> keys. Links become highlighted upon selection.</p> <p>NOTE: When a Help page is first displayed, no link is selected. Clicking the <b>Forward Tab</b> key once selects the <b>Previous Page</b> key. Clicking the <b>Forward Tab</b> key a second time selects the <b>Next Page</b> key. Clicking the <b>Forward Tab</b> key for a third time selects the first hyperlink on the page.</p> <p>It is sometimes difficult to see the highlighting of the <b>Previous</b> and <b>Next Page</b> keys.</p> | <p>Use the <b>Forward</b> and <b>Backward Tab</b> keys</p>  <p>to select the <b>Previous</b> and <b>Next Page</b> keys</p>  |
| <p>3. When you have selected the desired link, activate it by pressing the <b>Enter</b> key.</p>  |    |

Using Help  
**Context Sensitive Help not Available**

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<sup>®</sup> 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](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

---

|             |   |
|-------------|---|
| <b>NOTE</b> | 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.



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

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## 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/mxa_software)  
[http://www.agilent.com/find/exa\\_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 65](#)

[“MXA Accessories” on page 66](#)

[“EXA Instrument Options” on page 66](#)

[“EXA Accessories” on page 67](#)

[“Advanced Measurement Application Software” on page 67](#)

## 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**

| <b>Product</b> | <b>Description</b>                          |
|----------------|---|
| 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**

| <b>Product</b> | <b>Description</b>                                |
|----------------|---|
| 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**

| <b>Product</b> | <b>Description</b>                                 |
|----------------|--|
| 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             |

| <b>Product</b> | <b>Description</b>            |
|----------------|-------------------------------|
| 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**

| <b>Product</b> | <b>Description</b>                                |
|----------------|---|
| 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>

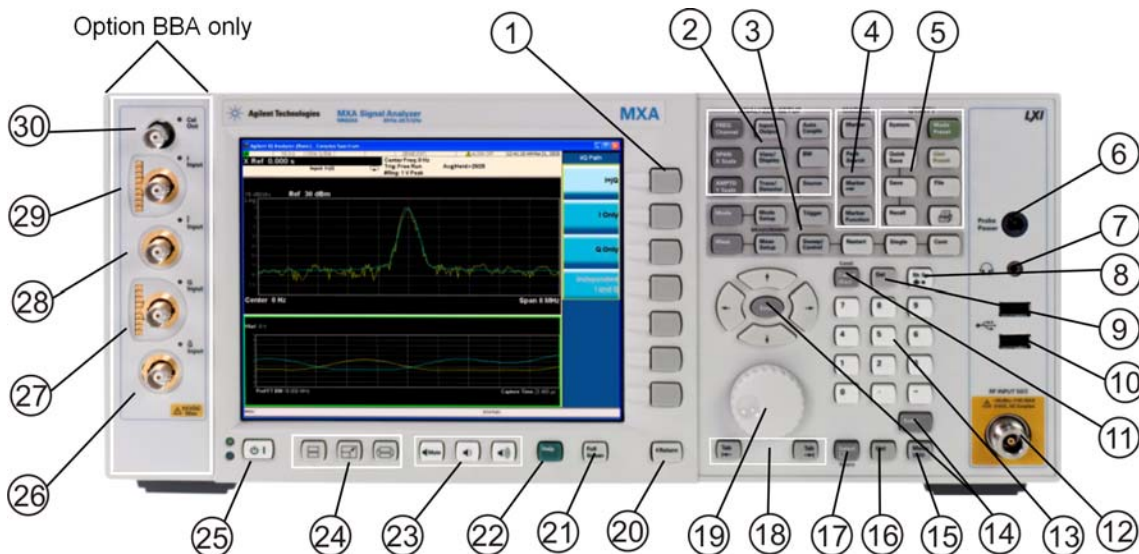
Select the *MXA N9020A, Options and Measurement Applications* link on the top of the page.

**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"> <li>• instrument configuration information and I/O setup,</li> <li>• printer setup and printing,</li> <li>• file management, save and recall,</li> <li>• instrument presets.</li> </ul> |
| 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"> <li>• returns instrument control from remote back to local (the front panel).</li> <li>• turns the display on (if it was turned off for remote operation).</li> <li>• can be used to clear errors. (Press the key once to return to local control, and a second time to clear error message line.)</li> </ul> <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"> <li>• exits Windows dialogs</li> <li>• clears errors</li> <li>• aborts printing</li> <li>• cancels operations.</li> </ul> |
| 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"> <li>• Increment and decrement the value of the current measurement selection.</li> <li>• Navigate help topics.</li> <li>• Navigate, or make selections, within Windows dialogs.</li> <li>• Navigate within forms used for setting up measurements.</li> <li>• Navigate within tables.</li> </ul> <p><b>NOTE</b> 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    | <p>Turns the analyzer on. A green light indicates power on. A yellow light indicates standby mode.</p> <p><b>NOTE</b> 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.*   |
| 27   | Q Input              | Input port for the Q channel for either single or differential mode.*  |
| 28   | $\bar{I}$ Input      | Input port for the I channel when in differential mode.*   |
| 29   | I Input              | Input port for the I channel for either single or differential mode.*  |
| 30   | Cal Out              | Output port for calibrating the I, $\bar{I}$ , Q and $\bar{Q}$ inputs and probes used with these inputs.*  |

\*. 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.

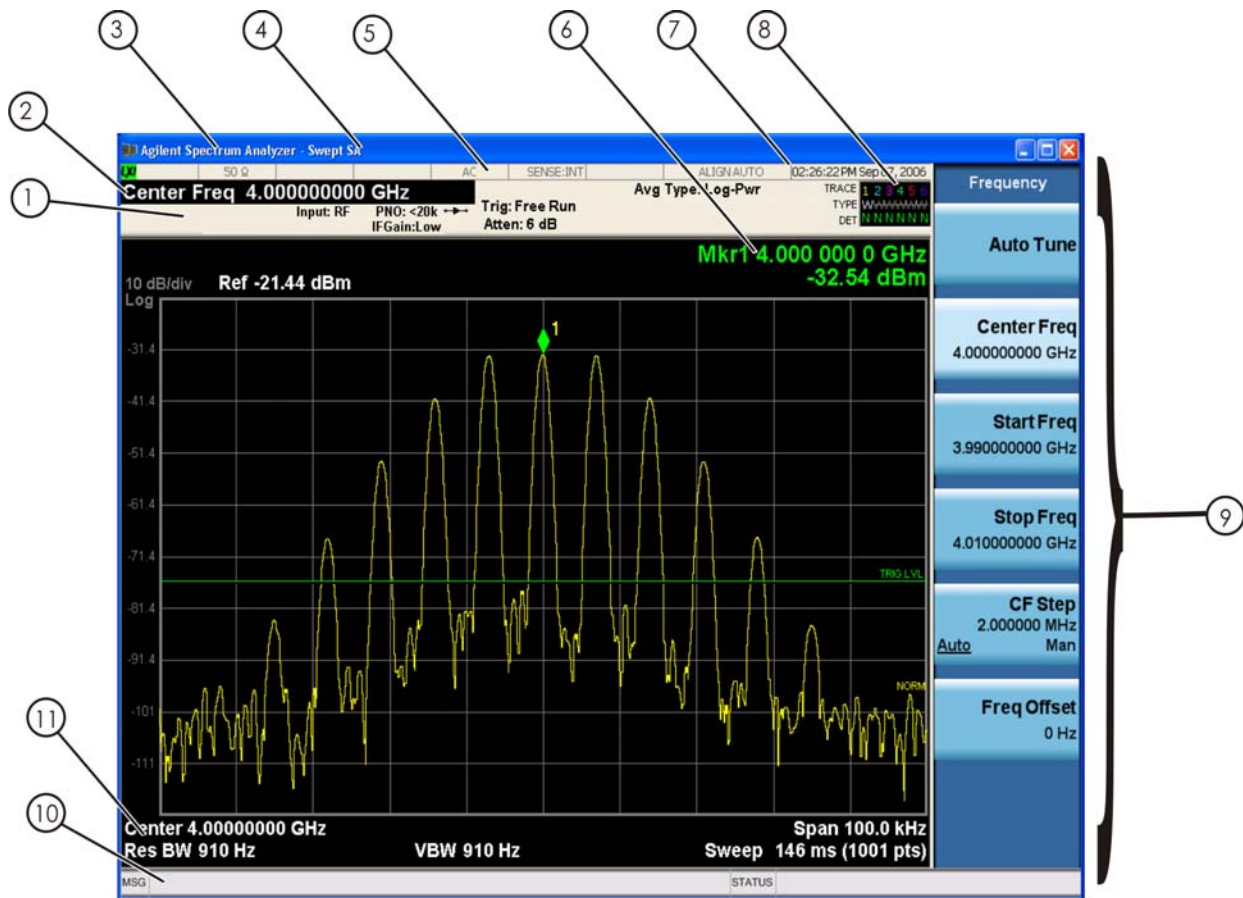
Some of the menu keys are grouped together by a yellow bar running behind the keys near the left side or by a yellow border around the group of keys. When you press a key within the yellow region, such as **Marker Noise**, the highlight moves to that key to show it has been selected. The keys that are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



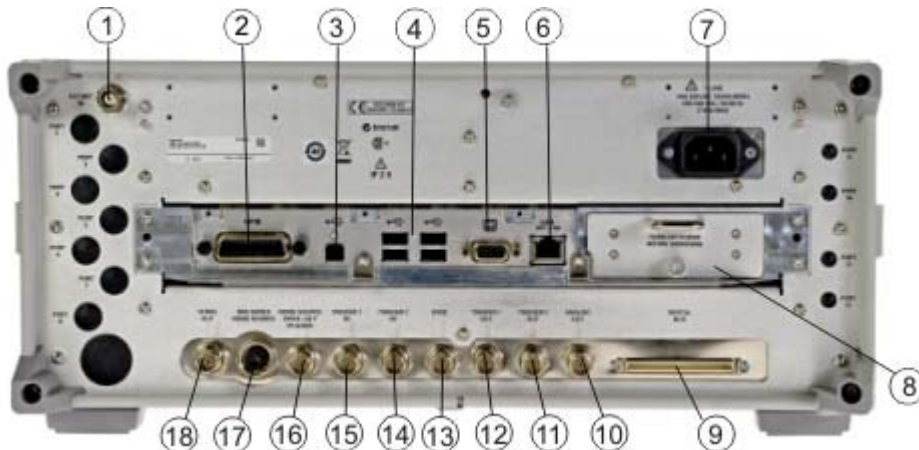
| Item | Description  | Function Keys   |
|------|--|---|
| 1    | Measurement bar - Shows general measurement settings and information.<br>  Indicates single/continuous measurement.<br>Some measurements include limits that the data is tested against. A Pass/Fail indication may be shown in the lower 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.   | <b>Mode</b>   |
| 4    | Measurement title - shows title information for the current measurement, or a title that you created for the measurement.  | <b>Meas</b><br><b>View/Display, Display, Title</b>          |



| Item | Description   | Function Keys   |
|------|---|---|
| 5    | Settings panel - displays system information that is not specific to any one application. <ul style="list-style-type: none"> <li>• Input/Output status - green LXI indicates the LAN is connected. RLTS indicate Remote, Listen, Talk, SRQ</li> <li>• Input impedance and coupling</li> <li>• Selection of external frequency reference</li> <li>• Setting of automatic internal alignment routine</li> </ul> | <b>Local and System, I/O Config</b><br><br><b>Input/Output, Amplitude, System</b> and others  |
| 6    | Active marker frequency, amplitude or function value  | <b>Marker</b>   |
| 7    | Settings panel - time and date display.   | <b>System, Control Panel</b>  |
| 8    | Trace and detector information  | <b>Trace/Detector, Clear Write (W) Trace Average (A) Max Hold (M) Min Hold (m)</b><br><b>Trace/Detector, More, Detector, Average (A) Normal (N) Peak (P) Sample (S) Negative Peak (p)</b> |
| 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



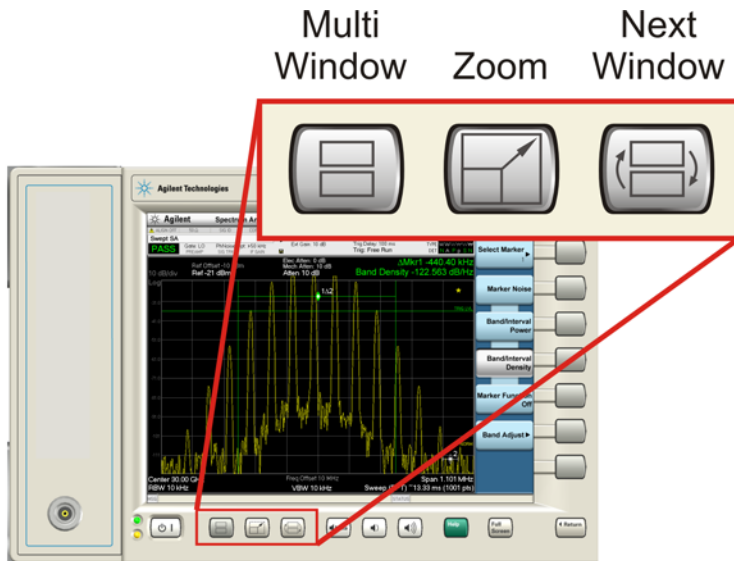
| Item |            | Description   |
|------|------------|---|
| #    | Name       |   |
| 1    | EXT REF IN | Input for an external frequency reference signal:<br><br>For MXA – 1 to 50 MHz<br>For EXA – 10 MHz.           |
| 2    | GPIB       | A General Purpose Interface Bus (GPIB, IEEE 488.1) connection 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                | <b>Front-panel key</b> |
| 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  
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>  
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 selected. If the selected window was zoomed, the next window will also be zoomed.

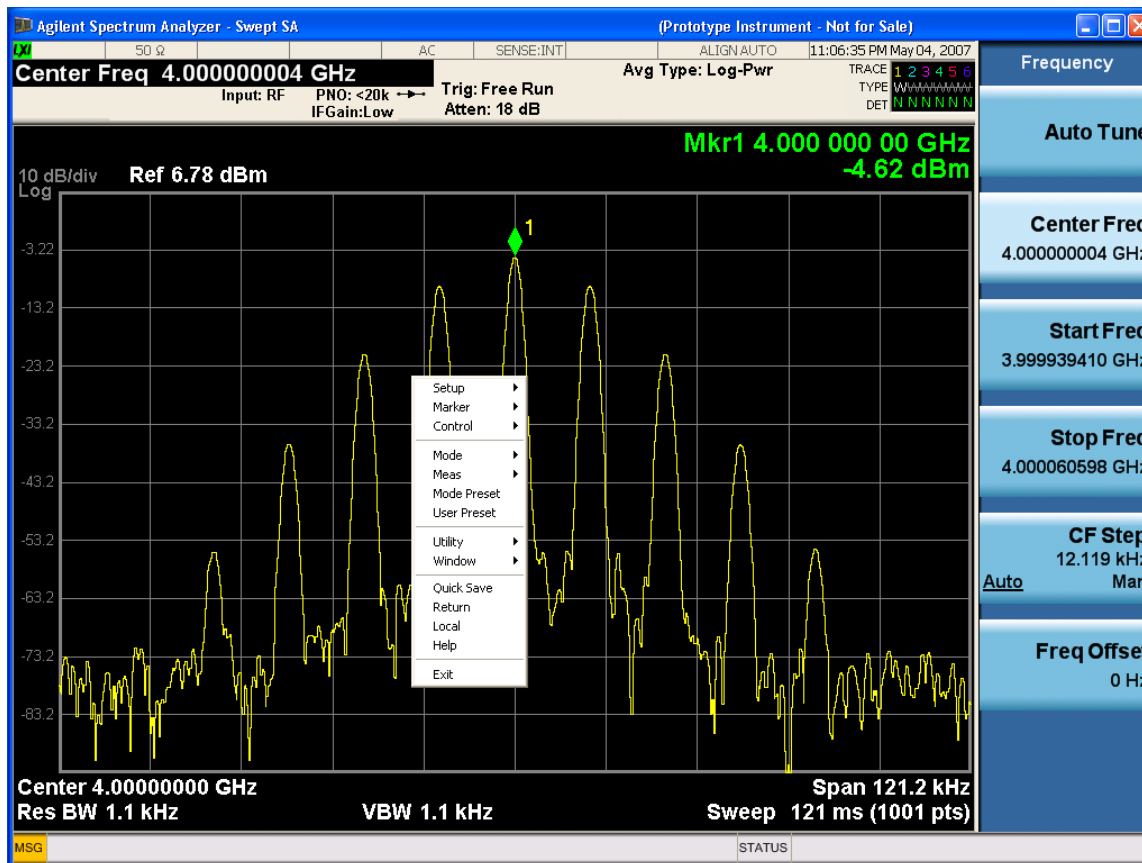
The window navigation does NOT use the arrow and select keys. Those are reserved for navigation within a window.

## Mouse and Keyboard Control

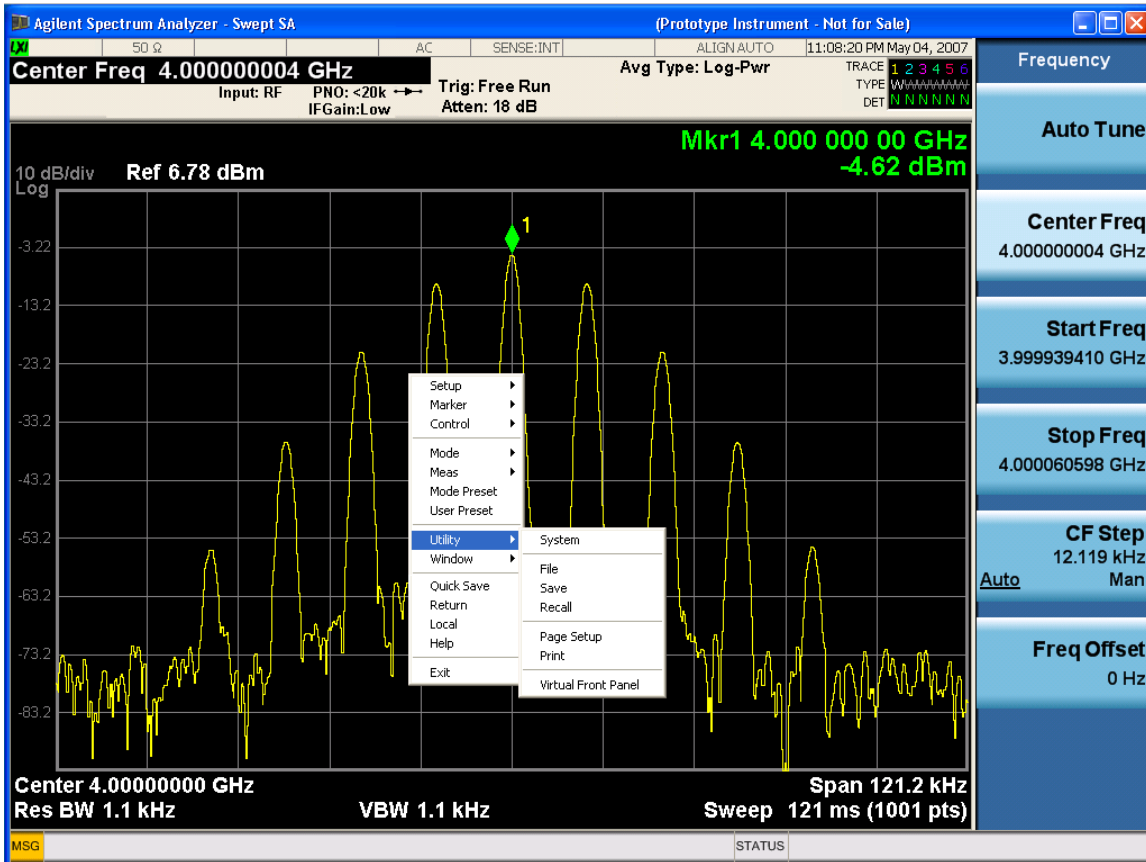
If you do not have access to the instrument front-panel, there are several ways that a mouse and PC Keyboard can give you access to functions normally accessed using the front-panel keys.

### Right-Click

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

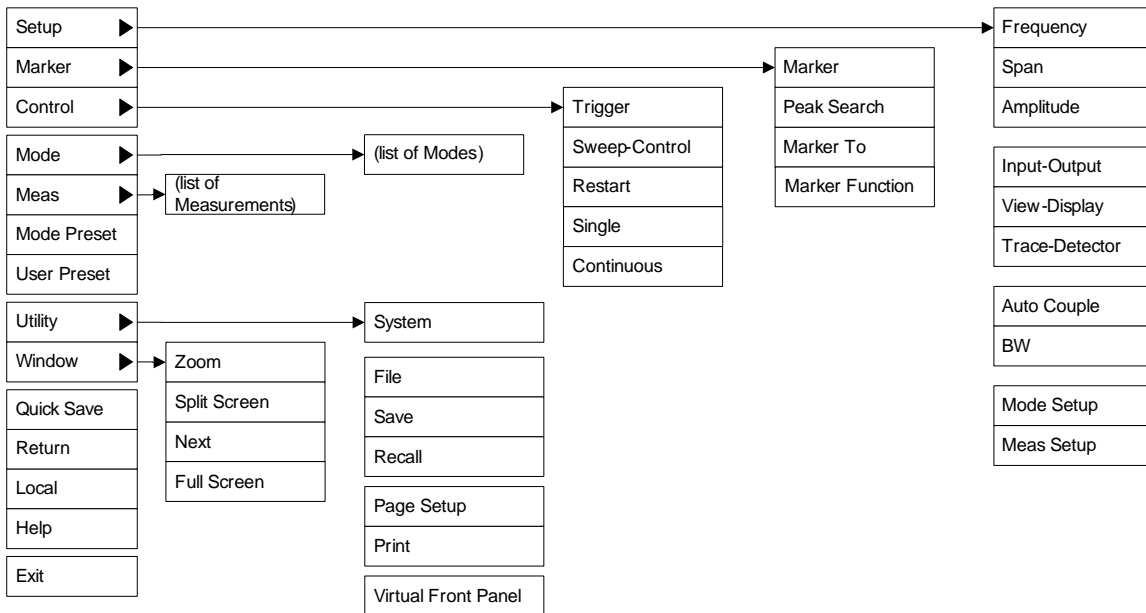


Placing the mouse on one of the rows marked with a right arrow symbol will cause that row to expand, as for example below where the mouse is hovered over the “Utility” row:



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:

| <b>Front-panel key</b> | <b>Key Codes</b> |
|------------------------|------------------|
| 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     |

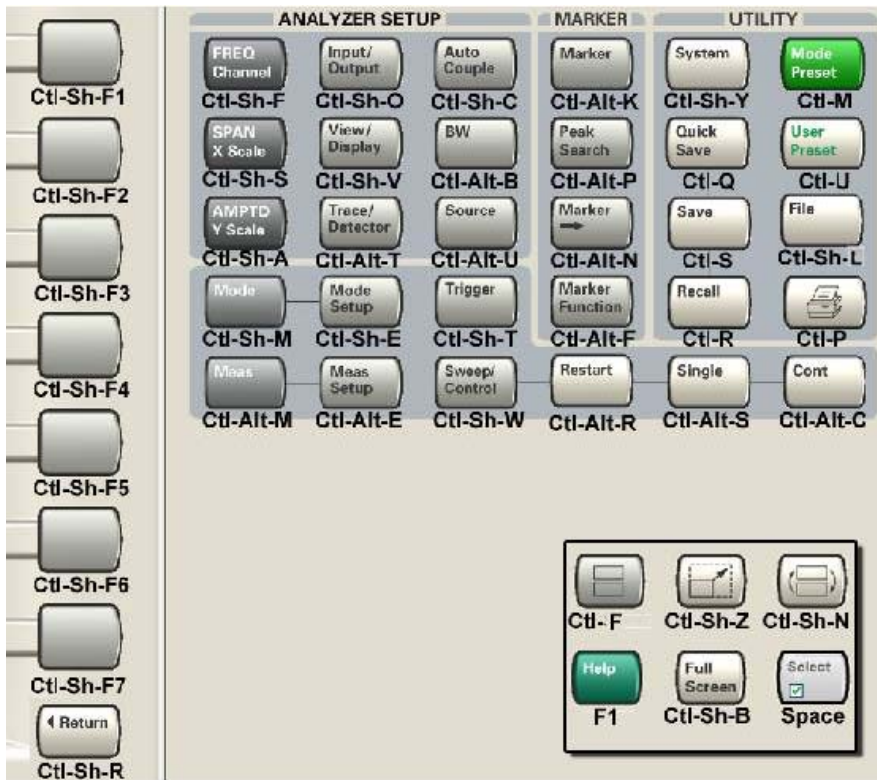


| <b>Front-panel key</b> | <b>Key Codes</b> |
|------------------------|------------------|
| Restart                | CTRL+ALT+R       |
| Single                 | CTRL+ALT+S       |
| Cont                   | CTRL+ALT+C       |
| Zoom                   | CTRL+SHIFT+Z     |
| Next Window            | CTRL+SHIFT+N     |
| Split Screen           | CTRL+L           |
| 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    |

About the Analyzer  
**Mouse and Keyboard Control**

| Front-panel key | Key Codes |
|-----------------|-----------|
| 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:



The analog demodulation measurements provide the capability of demodulating Amplitude, Frequency, or Phase modulated signals (AM, FM, PM). These measurements provide functionality that can be generally categorized as follows:

- Demodulating a modulated carrier and playing the modulating signal over a speaker (sometimes referred to as tune and listen)
- Displaying demodulated signals in both time and frequency domain
- Displaying modulation metrics

Each measurement has four basic windows in which to display demodulated data. The primary view displays all four of these windows. In all views, the display is split into signal display windows and a numeric results (metrics) window. The metrics window displays carrier and modulation metrics.

These views are designed such that you can identify analog modulated carriers, determine whether the carrier is a commercial or other broadcast station, and analyze the modulating signal.



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

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## 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](http://www.agilent.com/find/mxa_manuals).

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

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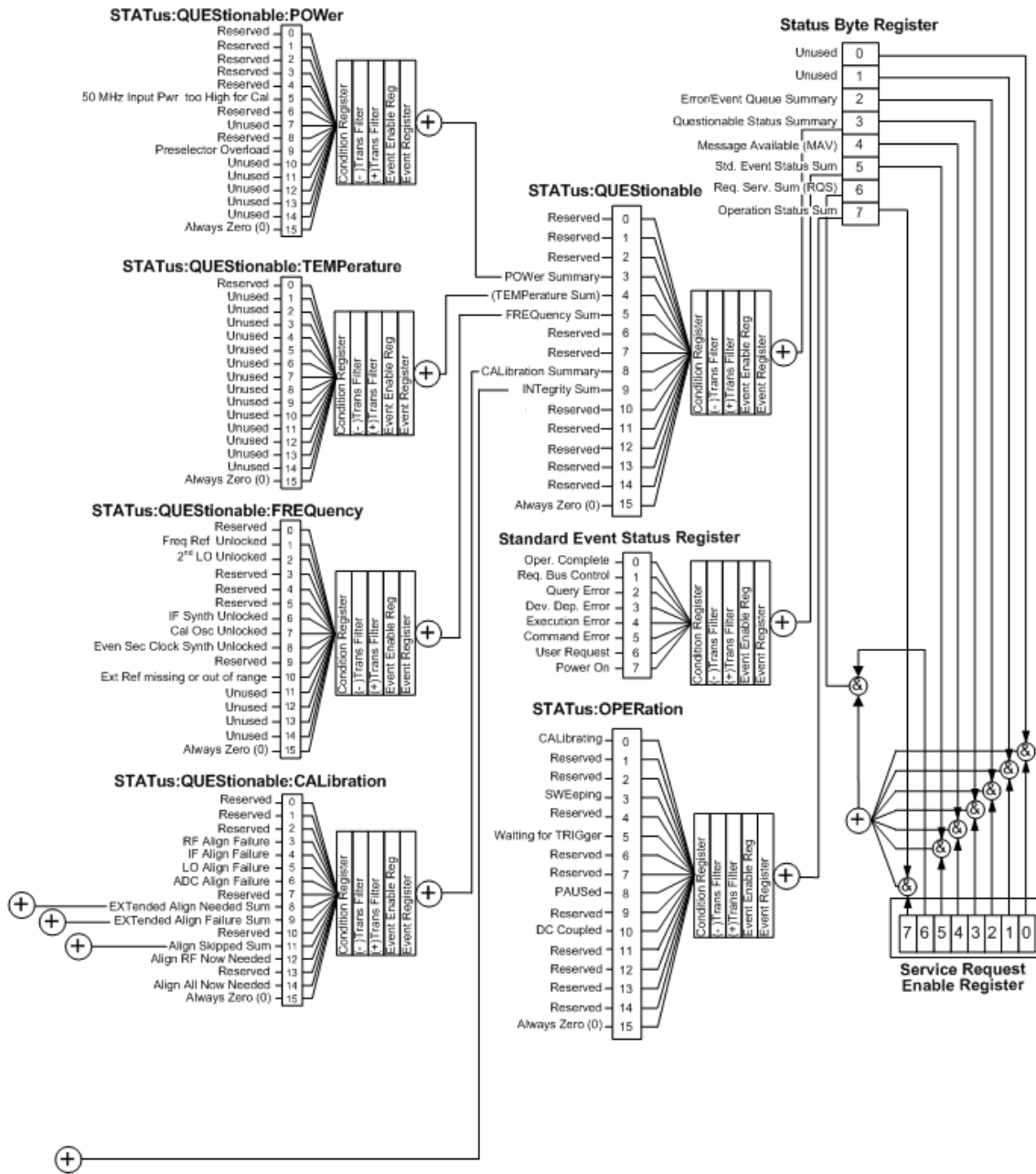
| Resource   | Description   |
|--|---|
| <b>X-Series Programmer's Guide</b>               | <p>Provides general SCPI programming information on the following topics:</p> <ul style="list-style-type: none"><li>• Programming the X-Series Applications</li><li>• Programming fundamentals</li><li>• Programming examples</li></ul> <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>   |
| <b>User's and Programmer's Reference manuals</b> | <p>Describes all front-panel keys and softkeys, including SCPI commands for a measurement application. Note that:</p> <ul style="list-style-type: none"><li>• Each measurement application has its own User's and Programmer's Reference.</li><li>• 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).</li></ul>  |
| <b>Embedded Help in your instrument</b>          | <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>   |
| <b>X-Series Getting Started Guide</b>            | <p>Provides valuable sections related to programming including:</p> <ul style="list-style-type: none"><li>• Licensing New Measurement Application Software - After Initial Purchase</li><li>• Configuring instrument LAN Hostname, IP Address, and Gateway Address</li><li>• Using the Windows XP Remote Desktop to connect to the instrument remotely</li><li>• Using the Embedded Web Server Telnet connection to communicate SCPI</li></ul> <p>This printed document is shipped with the instrument.</p> |
| <b>Agilent Application Notes</b>                 | <p>Printable PDF versions of pertinent application notes.</p>   |
| <b>Agilent VISA User's Guide</b>                 | <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>   |

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## STATus Subsystem (No equivalent front-panel keys)

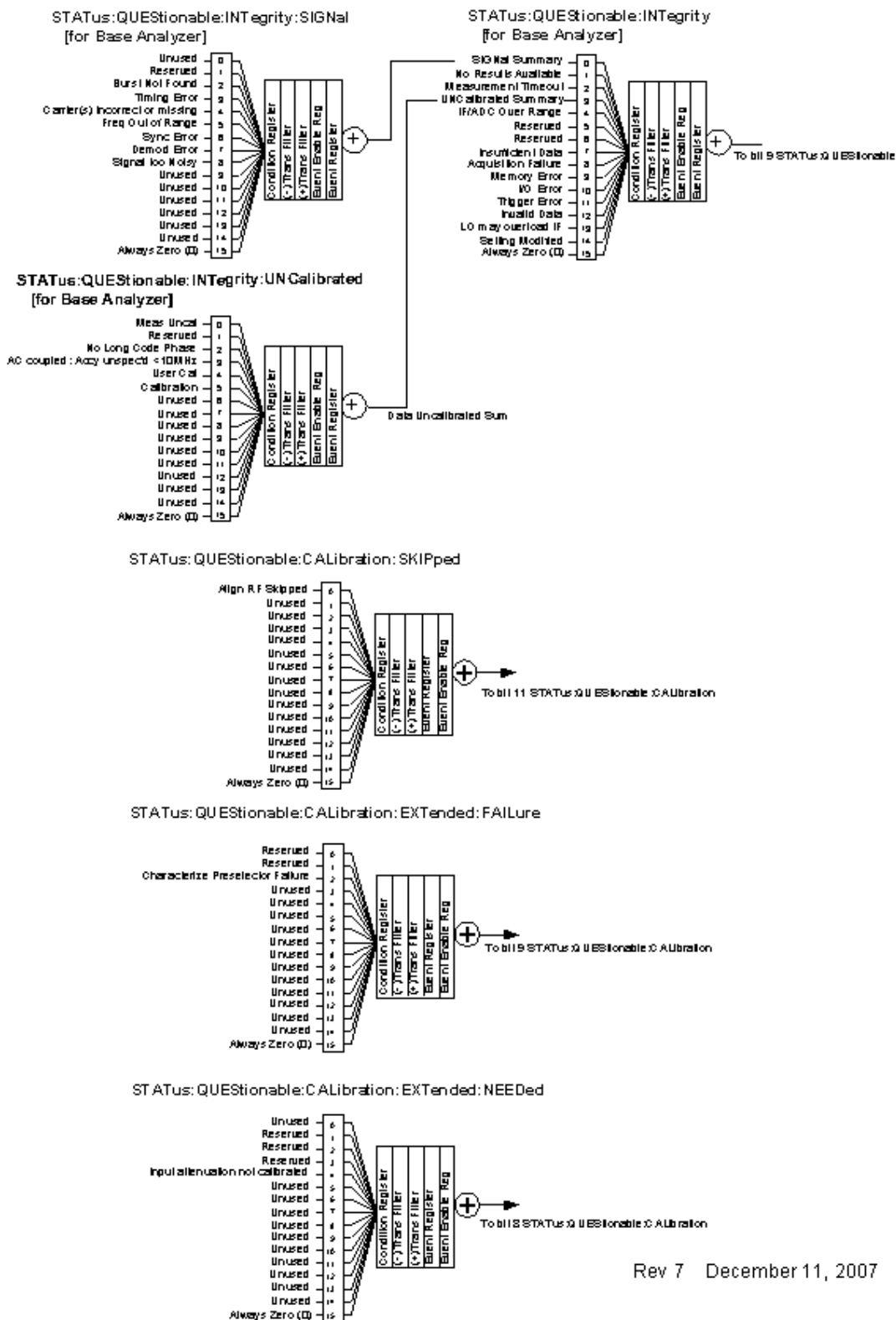
The following graphics show the current X-Series Status Register Subsystem implementation.

### 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, send the sum of all the bits that you want to monitor.

### Status Register Bit Values

|   |    |    |       |       |      |      |      |      |     |     |     |    |    |    |   |   |   |   |
|---|----|----|-------|-------|------|------|------|------|-----|-----|-----|----|----|----|---|---|---|---|
| <i>Decimal Value</i>  |    |    |       |       |      |      |      |      |     |     |     |    |    |    |   |   |   |   |
|   |    |    | 32768 | 16384 | 8192 | 4096 | 2048 | 1024 | 512 | 256 | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
| <b>Bit Number</b>   | 15 | 14 | 13    | 12    | 11   | 10   | 9    | 8    | 7   | 6   | 5   | 4  | 3  | 2  | 1 | 0 |   |   |
| STATus:OPERation:ENABLE < num ><br>STATus:OPERation:ENABLE? |    |    |       |       |      |      |      |      |     |     |     |    |    |    |   |   |   |   |
| <b>Standard Operation Event Enable Register</b>             |    |    |       |       |      |      |      |      |     |     |     |    |    |    |   |   |   |   |
| <small>ck730a</small>                                       |    |    |       |       |      |      |      |      |     |     |     |    |    |    |   |   |   |   |

Bit 15 is not used to report status.

Example 1:

1. To enable bit 0 and bit 6 of standard event status register, 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 care about that specific condition. For example, you want to know what was happening with bit 10 in the Status Questionable Integrity register, and do not care about any other bits.
2. It is usually a good idea to start by clearing all the status registers with \*CLS.
3. Sending the STAT:QUES:INT:ENAB 1024 command enables you to 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 show when an auto-trigger timeout occurs. If you want to know when the Auto-trigger timeout condition is cleared, 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 look at only 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 can use the serial polling functionality available for the particular bus/software that you are using to monitor the Status Byte Register. (You can 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.

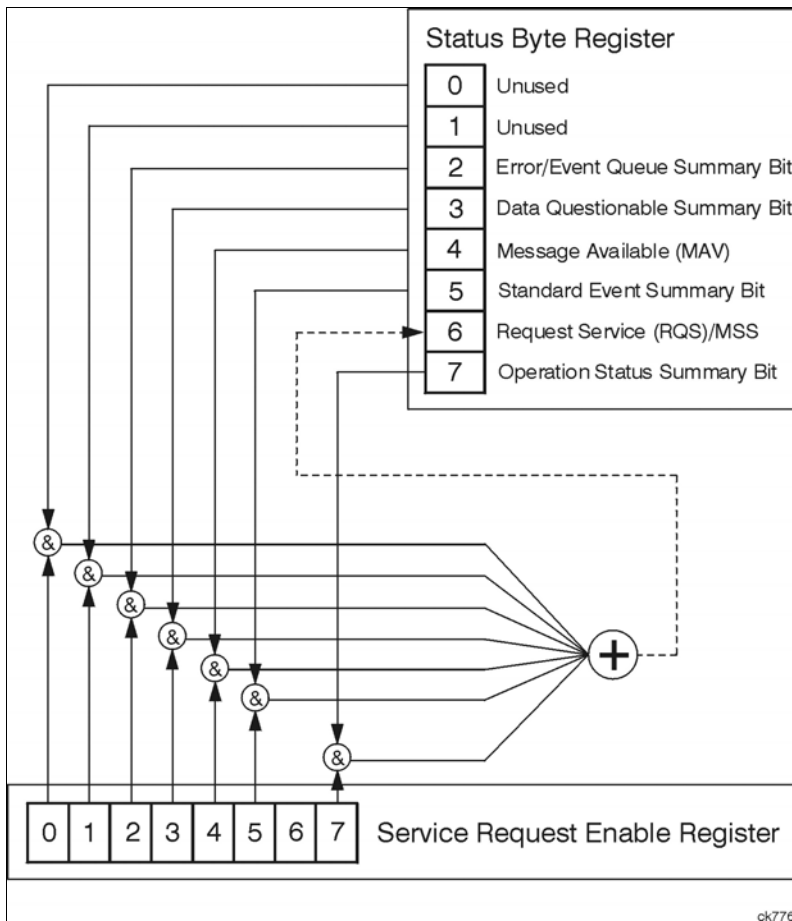
Programming the Analyzer  
**STATUS Subsystem (No equivalent front-panel keys)**

3. Restart the measurement (send INIT).

### Status Register System

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

### The Status Byte Register



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

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

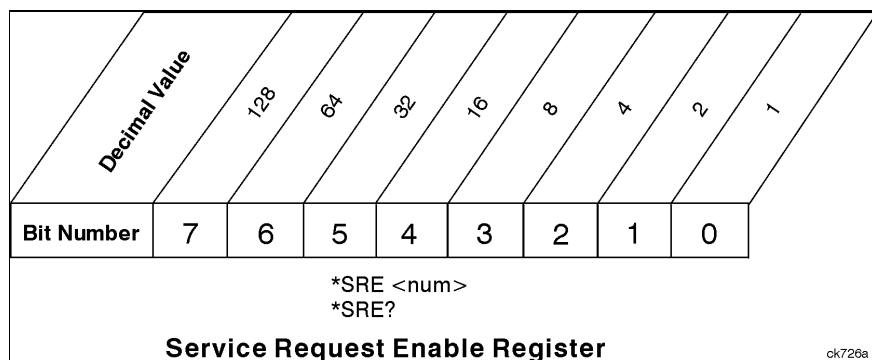
To query the status byte register, send the command \*STB?. The response will be the decimal sum of the bits which are set to 1. For example, if bit number 7 and bit number 3 are set to 1, the decimal sum of the 2 bits is 128 plus 8. So the decimal value 136 is returned. The \*STB command does not clear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

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

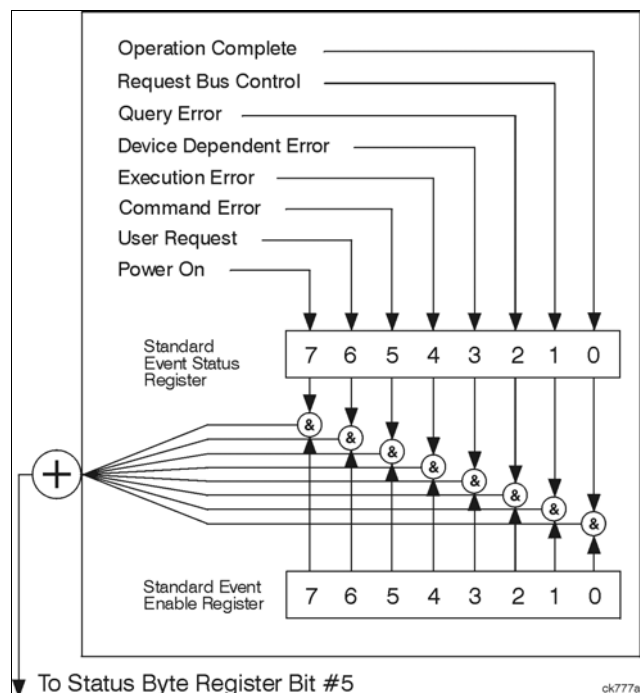
In addition to the status byte register, the status byte group also contains the service request enable register. This register lets you choose which bits in the status byte register will trigger a service request.

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

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



**Standard Event Status Register**





The standard event status register contains the following bits:

|                                       |          |                          |               |                 |                        |             |                 |                    |  |
|---------------------------------------|----------|--------------------------|---------------|-----------------|------------------------|-------------|-----------------|--------------------|--|
|                                       |          |                          |               |                 |                        |             |                 |                    |  |
| <b>Description</b>                    | Power On | User Request Key (Local) | Command Error | Execution Error | Device Dependent Error | Query Error | Request Control | Operation Complete |  |
| <b>Bit Number</b>                     | 7        | 6                        | 5             | 4               | 3                      | 2           | 1               | 0                  |  |
| *ESR?                                 |          |                          |               |                 |                        |             |                 |                    |  |
| <b>Standard Event Status Register</b> |          |                          |               |                 |                        |             |                 |                    |  |
| 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.   |

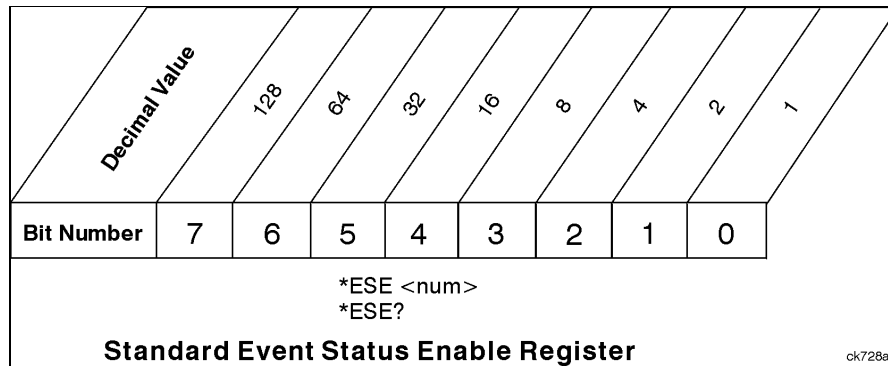
The standard event status register is used to determine the specific event that set bit 5 in the status byte register. To query the standard event status register, send the command \*ESR?. The response will be the decimal sum of the bits which are enabled (set to 1). For example, if bit number 7 and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

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

<integer> is the sum of the decimal values of the bits you want to enable. For example, to enable bit 7 and bit 6 so that whenever either of those bits is set to 1, the standard event status summary bit of the status byte register will be set to 1, send the command \*ESE 192 (128 + 64). The command \*ESE? returns the decimal value of the sum of the bits previously enabled with the \*ESE <integer> command.

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



### 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.<br><br>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.<br><br>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           |
| Instrument S/W Revision           | Prior to A.02.00             |

### Operation Enable

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

---

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

---

|                                   |  |
|-----------------------------------|--|
| Mode                              | All  |
| Remote Command                    | :STATus:OPERation:ENABle <integer><br>: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  |
| 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         |
| 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><br>: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  |
| 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><br>: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   |
| Instrument S/W Revision           | Prior to A.02.00  |

### Preset the Status Byte

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

Remote Command:                   :STATus:PRESet

Example:                            STAT:PRES

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

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<br>Sets the register so that temperature summary will be reported to the Status Byte Register<br><br>:STATus:QUESTionable:ENABle? |
| Example                           | STAT:OPER:PTR 1<br>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  |
| 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            |
| 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  |
| Remote Command | :STATus:QUESTionable:NTRansition 16<br>Temperature summary 'questionable cleared' will be reported to the Status Byte Register.<br><br>:STATus:QUESTionable:NTRansition? |

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

|                                   |  |
|-----------------------------------|--|
| Example                           | STAT:QUES:NTR 16<br>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  |
| 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><br>: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  |
| 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                          |
| 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><br>: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  |
| 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]? |
| Example                           | STAT:QUES:CAL?                            |
| Preset                            | 0   |
| SCPI Status Bits/OPC Dependencies | Sequential command                        |
| 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><br>: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   |
| 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><br>: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   |
| 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                                  |
| 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<br><integer><br><br>: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  |
| 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                                |
| 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<br><integer><br><br>:STATus:QUESTionable:CALibration:SKIpped:NTRansition? |
| Example                              | STAT:QUES:CAL:SKIP:NTR 1 Align RF skipped is not required.   |
| Preset                               | 0  |
| SCPI Status Bits/OPC<br>Dependencies | Sequential command   |
| Min                                  | 0  |
| Max                                  | 32767  |
| 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<br><integer><br><br>:STATus:QUESTionable:CALibration:SKIpped:PTRansition? |
| Example                              | STAT:QUES:CAL:SKIP:PTR 1 Align RF skipped is required.   |
| Preset                               | 32767  |
| SCPI Status Bits/OPC<br>Dependencies | Sequential command   |
| Min                                  | 0  |
| Max                                  | 32767  |
| 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:CONDition? |
| Example                           | STAT:QUES:CAL:EXT:FAIL:COND?                                 |
| Preset                            | 0  |
| SCPI Status Bits/OPC Dependencies | Sequential command   |
| 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   |
| Remote Command                    | :STATus:QUESTionable:CALibration:EXTended:FAILure:ENABLE <integer><br>: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   |
| 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   |
| 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:NTRansition <integer><br><br>:STATus:QUESTionable:CALibration:EXTended:FAILure:NTRansition? |
| 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   |
| 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:PTRansition <integer><br><br>:STATus:QUESTionable:CALibration:EXTended:FAILure:PTRansition? |
| 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   |
| 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  |
| 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><br><br>: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   |
| 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  |
| 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:<br>NTRansition <integer><br><br>:STATus:QUESTionable:CALibration:EXTended:NEEDED:<br>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   |
| 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   |
| Remote Command                    | :STATus:QUESTionable:CALibration:EXTended:NEEDED:<br>PTRansition <integer><br><br>:STATus:QUESTionable:CALibration:EXTended:NEEDED:<br>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   |
| 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                        |
| 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><br>: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   |
| 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                      |
| 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><br>: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   |
| SCPI Status Bits/OPC Dependencies | Sequential command  |
| Min                               | 0   |
| Max                               | 32767   |
| Instrument S/W Revision           | Prior to A.02.00  |

### Questionable Frequency Positive Transition

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

|                                   |   |
|-----------------------------------|---|
| Mode                              | All   |
| Remote Command                    | :STATus:QUESTionable:FREQuency:PTRansition <integer><br>: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   |
| 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                        |
| 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><br>:STATus:QUESTionable:INTEgrity:ENABle?   |
| Example                           | STAT:QUES:INT:ENAB 8<br>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   |
| 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                      |
| Instrument S/W Revision           | Prior to A.02.00                        |

### Questionable Integrity Negative Transition

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

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

|                                   |   |
|-----------------------------------|---|
| Mode                              | All   |
| Remote Command                    | :STATus:QUESTionable:INTEgrity:NTRansition <integer><br>: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   |
| 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><br>: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  |
| 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                               |
| 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><br>:STATus:QUEStionable:INTEgrity:SIGNal:ENABle?                     |
| Example                           | STAT:QUES:INT:SIGN:ENAB 4<br>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   |
| 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  |
| Remote Command                    | :STATus:QUESTionable:INTEgrity:SIGNa1[:EVENT]? |
| Example                           | STAT:QUES:INT:SIGN?                            |
| Preset                            | 0  |
| SCPI Status Bits/OPC Dependencies | Sequential command                             |
| 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:SIGNa1:NTRansition<br><integer><br><br>:STATus:QUESTionable:INTEgrity:SIGNa1:NTRansition? |
| Example                           | STAT:QUES:INT:SIGN:NTR 4<br>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  |
| 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<br><integer><br><br>:STATus:QUESTionable:INTEgrity:SIGNal:PTRansition?   |
| Example                           | STAT:QUES:INT:SIGN:PTR 4<br>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  |
| 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                                     |
| 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<br>:STATus:QUESTionable:INTEgrity:UNCalibrated:ENABle?                         |
| Example                           | STAT:QUES:INT:UNC:ENAB 1<br>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   |
| Max                               | 32767   |
| 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                                   |
| 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<br><integer><br><br>:STATus:QUESTionable:INTEgrity:UNCalibrated:NTRansition<br>? |
| 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  |
| 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<br><integer><br><br>:STATus:QUESTionable:INTEgrity:UNCalibrated:PTRansition<br>?  |
| Example                           | STAT:QUES:INT:UNC:PTR 1<br>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   |
| 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                    |
| 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><br>: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  |
| 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                  |
| 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><br>: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  |
| 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><br>: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  |
| 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                          |
| 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><br>: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   |
| 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                        |
| 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><br>:STATus:QUESTionable:TEMPerature:NTRansition?                                     |
| Example                           | STAT:QUES:TEMP:NTR 1<br>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   |
| 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><br>:STATus:QUESTionable:TEMPerature:PTRansition?  |
| Example                           | STAT:QUES:TEMP:PTR 1<br>Reference Oscillator Oven became 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  |
| 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. (that is, 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                          | <b>No equivalent key. Related key System, Show Errors, Clear Error Queue</b>   |
| Remote Command                    | *CLS   |
| Example                           | *CLS<br>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.                                   |
| 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       | <b>No equivalent key. Related key System, Show Errors, Clear Error Queue</b> |
| Remote Command | *ESE <integer><br>*ESE?  |

|                                   |   |
|-----------------------------------|---|
| Example                           | *ESE 36<br>Enables the Standard Event Status Register to monitor query and command errors (bits 2 and 5).<br><br>*ESE?<br>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   |
| 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?<br>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  |
| 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                | <b>No equivalent key. See related key System, Show System.</b>   |
| Remote Command          | *IDN?  |
| Example                 | *IDN?<br>Returns instrument identification information, such as:<br>Agilent Technologies,N9020A,US01020004,A.01.02 |
| 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<br><br>*OPC?  |
| Example:                           | INIT:CONT 0<br>Selects single sweeping.<br><br>INIT:IMM<br>Initiates a sweep.<br><br>*OPC?<br>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.<br><br>*OPC is an overlapped command, but *OPC? is sequential. |
| 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?  
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  
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  |
| 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><br>*SRE?   |
| Example:                           | *SRE 22<br>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   |
| 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?<br>Returns a decimal value for the bits in the status byte register.<br>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).  |
| 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                | <b>No equivalent key. See related keys Single and Restart.</b>  |
| Remote Command          | *TRG  |
| Example                 | *TRG<br>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.  |
| 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?<br>Runs the self-test routines and returns 0=passed, 1=some part failed. |
| 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<br>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. |
| 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.

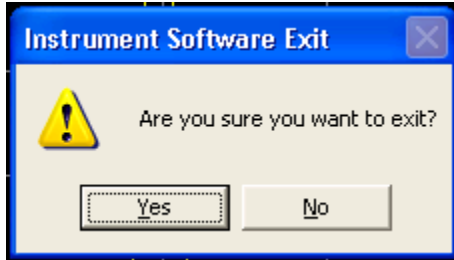
|                         |   |
|-------------------------|---|
| Mode                    | All   |
| Remote Command          | :SYSTem:PRINT:THEME<br>TDCoLor   TDMonochrome   FCoLoR   FMONochrome<br>:SYSTem:PRINT:THEME?  |
| Example                 | :SYST:PRIN:THEM FCOL  |
| Preset                  | 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                | <b>File, Exit</b>   |
| 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                | <b>Front-panel key</b>   |
| 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]<br>:SYSTem:PRESet:PERSistent | System Menu; Restore System Default Menu |
| User Preset                    | :SYSTem:PRESet:USER                                | User Preset Menu                         |
| User Preset All Modes          | :SYSTem:PRESet:USER:ALL                            | User Preset Menu                         |
| Power On Mode Preset           | :SYSTem:PON:TYPE MODE                              | System Menu                              |
| Power On User Preset           | :SYSTem:PON:TYPE USER                              | System Menu                              |
| Power On Last State            | :SYSTem:PON:TYPE LAST                              | System Menu                              |

## Restore Mode Defaults

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

|                         |   |
|-------------------------|---|
| Key Path                | <b>Mode Setup</b>   |
| 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  |

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## **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 does not exist in the current directory and advance again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a 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 381](#).

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## **Save**

Operation of this key is identical across several measurements. For details about this key, see [“Save” on page 405](#).

## System

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

|                         |  |
|-------------------------|--|
| Key Path                | <b>Front-panel key</b>                       |
| 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                | <b>System</b>  |
| Mode                    | All  |
| Remote Command          | :SYSTem:SHOW<br>OFF ERRor SYSTem HARDware LXI HWSTatistics ALIGNment SOFTware<br>: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                | <b>System, Show</b>  |
| Mode                    | All  |
| Remote Command          | :SYSTem:ERRor [:NEXT] ?  |
| Example                 | :SYST:ERR?   |
| Restriction and Notes   | The return string has the format:<br>“<Error Number>,<Error>”<br><br>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                | <b>System, Show, Errors</b> |
| Instrument S/W Revision | Prior to A.02.00            |

## Previous Page

See [“Next Page”](#) on page 149.

|                         |                             |
|-------------------------|-----------------------------|
| Key Path                | <b>System, Show, Errors</b> |
| 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 shows a number in [square brackets]. This is the number of currently open status items.

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

## Status

See [“History”](#) on page 150.

## 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                | <b>System, Show, Errors</b>   |
| Mode                    | All   |
| Remote Command          | :SYSTem:ERRor:VERBoSe OFF ON 0 1<br>: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                | <b>System, Show, Errors</b> |
| 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                | <b>System, Show, Errors</b> |
| 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                | <b>System, Show</b> |
| Mode                    | All                 |
| Example                 | SYST:SHOW SYST      |
| Instrument S/W Revision | Prior to A.02.00    |

## System Functions System

### 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:

| <b>Hardware Information</b> |            |             |         |     |        |       |      |
|-----------------------------|------------|-------------|---------|-----|--------|-------|------|
| MXA Signal Analyzer         |            |             |         |     |        |       |      |
| Product Number: N9020A      |            |             |         |     |        |       |      |
| Serial Number: US46220107   |            |             |         |     |        |       |      |
| Firmware Revision: A.01.14  |            |             |         |     |        |       |      |
| Assembly Name               | Part #     | Serial #    | Mat Rev | Rev | OF Rev | Hw Id | Misc |
| Analog IF                   | E441060104 | 78060200131 | 003     | 0   | C      | 15    |      |
| YIG Tuned Filter            | 50877305   | 11061500550 | 005     | 0   | A      | 11    |      |
| Digital IF                  | E441060105 | 78060100559 | 003     | 0   | F      | 14    |      |
| Front End Controller        | E441060101 | 78060100147 | 004     | 2   | A      | 8     |      |
| Low Band Switch             | E441060170 | 78060800346 | 005     | 1   | A      | 10    |      |
| LO Synthesizer              | E441060102 | 78060100226 | 003     | 3   | G      | 2     |      |
| Reference                   | E441060108 | 78060300420 | 004     | 1   | C      | 16    |      |
| Front End                   | E441060154 | 13062800820 | 010     | 2   | B      | 9     |      |
|                             |            |             |         |     |        |       |      |
|                             |            |             |         |     |        |       |      |
|                             |            |             |         |     |        |       |      |
|                             |            |             |         |     |        |       |      |

The Previous Page is 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                | <b>System, Show</b> |
| 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                | <b>System, Show</b> |
| 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                | <b>System, Show, LXI</b> |
| Instrument S/W Revision | Prior to A.02.00         |

## Next Page

See ["Next Page" on page 149](#)

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

## Previous Page

See ["Next Page" on page 149](#).

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

## System Functions

### System

#### 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                | <b>System, Show, LXI, LXI Event Log</b>  |
| Remote Command          | :LXI:EVENT:LOG:CIRCular[:ENABLE] ON OFF 1 0<br>:LXI:EVENT:LOG:CIRCular[:ENABLE]?                                       |
| Example                 | :LXI:EVENT:LOG:CIRC 1  |
| Preset                  | Not affected by a Preset. The default value of "ON" can be restored by pressing <b>System, Restore Defaults, Misc.</b> |
| 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                | <b>System, Show, LXI, LXI Event Log</b> |
| Remote Command          | :LXI:EVENT:LOG:CLEar                    |
| Example                 | :LXI:EVENT:LOG:CLE                      |
| Instrument S/W Revision | Prior to A.02.00                        |

#### Size

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

|                         |  |
|-------------------------|--|
| Key Path                | <b>System, Show, LXI, LXI Event Log</b>  |
| Remote Command          | :LXI:EVENT:LOG:SIZE <size><br>:LXI:EVENT:LOG:SIZE?   |
| Example                 | :LXI:EVENT:LOG:SIZE 256  |
| Preset                  | Not affected by a Preset. The default value of "64" can be restored by pressing <b>System, Restore Defaults, Misc.</b> |
| 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                | <b>System, Show, LXI, LXI Event Log</b>  |
| Remote Command          | :LXI:EVENT:LOG:ENABLe ON OFF 1 0<br>:LXI:EVENT:LOG:ENABLe?   |
| Example                 | :LXI:EVENT:LOG:ENAB ON   |
| Preset                  | Not affected by a Preset. The default value of "ON" can be restored by pressing <b>System, Restore Defaults, Misc.</b> |
| State Saved             | Saved in instrument state.   |
| Range                   | ON OFF 0 1   |
| Instrument S/W Revision | Prior to A.02.00   |

### Count (Remote Command Only)

Returns the number of entries currently in the LXI Event Log.

|                          |                       |
|--------------------------|-----------------------|
| Remote Command:          | :LXI:EVENT:LOG:COUNT? |
| Example:                 | :LXI:EVENT:LOG:COUN?  |
| Range:                   | 0 – Size              |
| Instrument S/W Revision: | Prior to A.02.00      |

### Next Entry (Remote Command 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:EVENT:LOG?        |
| Instrument S/W Revision: | Prior to A.02.00       |

### All (Remote Command 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 Command 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 ? <int Index>

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

### Beginning Entry (Remote Command 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 : FBENTRY

Example:                           : LXI : EVEN : 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                | <b>System</b>   |
| Mode                    | All   |
| Remote Command          | :SYSTem: PON: TYPE MODE   USER   LAST   PRESet<br>: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                | <b>System, Power On</b> |
| 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                | <b>System, Power On</b> |
| 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                | <b>System, Power On</b>   |
| 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              | <b>System, Power On</b>  |
| Mode                  | All  |
| Remote Command        | :SYSTem: PON:MODE<br>SA   BASIC   ADEMOD   NFIGURE   PNOISE   CDMA2K   TDSCDMA   VSA   VSA89<br>601   WCDMA   WIMAXOFDMA<br>: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                | <b>System, Power On</b> |
| 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                | <b>System, Power On, Configure Applications</b> |
| 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                | <b>System, Power On, Configure Applications</b> |
| 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                | <b>System, Power On, Configure Applications</b> |
| 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                | <b>System, Power On, Configure Applications</b> |
| Instrument S/W Revision | A.02.00   |

## Select/Deselect

Toggles the currently highlighted application in the list.

|                         |   |
|-------------------------|---|
| Key Path                | <b>System, Power On, Configure Applications</b> |
| 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                | <b>System, Power On, Configure Applications</b>  |
| 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       | <b>System, Power On, Configure Applications</b>                                       |
| 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

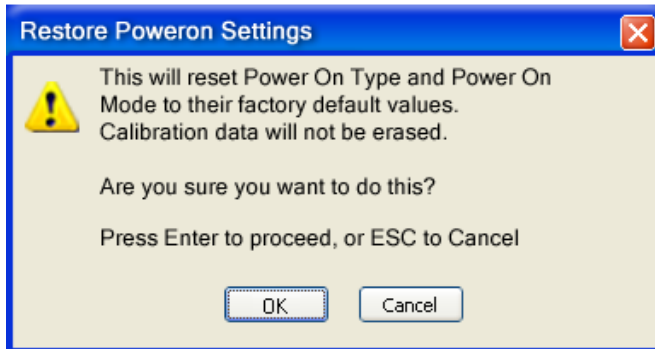
### Configuration Application Memory (Remote Command Only)

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 actually cause the reset to be executed is through OK or Enter.

|                         |                         |
|-------------------------|-------------------------|
| Key Path                | <b>System, Power On</b> |
| 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                | <b>System</b>    |
| 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                          | <b>System, Alignments</b>  |
| Mode                              | All  |
| Remote Command                    | :CALibration:AUTO ON PARTial OFF ALERT<br>: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 | <b>System, Alignments, Auto Align</b> |
| Mode     | All                                   |
| Example  | :CAL:AUTO ON                          |

|                                   |  |
|-----------------------------------|--|
| Restriction and Notes             | <p>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.</p> <p>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.</p> |
| SCPI Status Bits/OPC Dependencies | <p>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 <b>Align Now, RF</b>, the Error Condition and Status Questionable Calibration bit 11 are cleared.</p>  |
| 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 icon. The warning icon is to inform the operator that they are responsible for maintaining the warranted operation of the instrument

|                         |   |
|-------------------------|---|
| Key Path                | <b>System, Alignments, Auto Align</b>                                       |
| 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                | <b>System, Alignments, Auto Align</b>                                   |
| 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       | <b>System, Alignments, Auto Align</b>                     |
| Mode           | All   |
| Remote Command | :CALibration:AUTO:MODE ALL NRF<br>: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                          | <b>System, Alignments, Auto Align</b>   |
| Mode                              | All   |
| Remote Command                    | :CALibration:AUTO:ALERT TTEMperature   DAY   WEEK   NONE<br>:CALibration:AUTO:ALERT?  |
| Example                           | :CAL:AUTO:ALERT 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

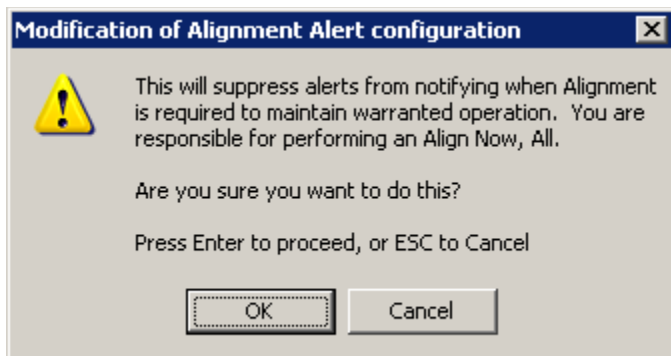
With Auto Align Alert set to **Time & Temperature** the instrument will signal an alert when alignments expire due to the combination of the passage of time and changes in temperature. The alert is the Error Condition “Align Now, All required”. If this choice for Alert is selected, the absence of an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

|                                   |  |
|-----------------------------------|--|
| Key Path                          | <b>System, Alignments, Auto Align, Alert</b>                   |
| Mode                              | All  |
| Example                           | :CAL:AUTO:ALERT 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:



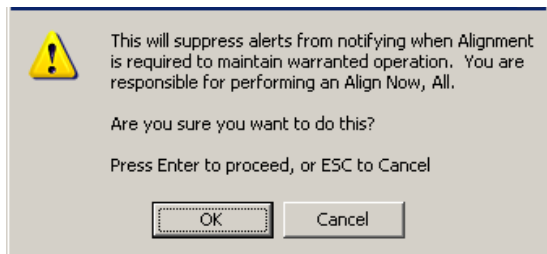
No confirmation is required when Alert is configured through a remote command.

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





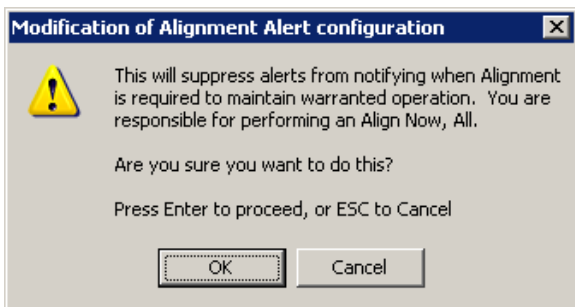
No confirmation is required when Alert is configured through a remote command.

|                                   |  |
|-----------------------------------|--|
| Key Path                          | <b>System, Alignments, Auto Align, Alert</b>                   |
| 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 recommend 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                | <b>System, Alignments, Auto Align, Alert</b> |
| Mode                    | All  |
| Example                 | :CAL:AUTO:ALER NONE                          |
| 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                | <b>System, Alignments</b> |
| 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       | <b>System, Alignments, Align Now</b>      |
| Mode           | All                                       |
| Remote Command | :CALibration[:ALL]<br>:CALibration[:ALL]? |
| Example        | :CAL                                      |

|                                   |   |
|-----------------------------------|---|
| Remote Command Notes              | <p>:CALibration[:ALL]? returns 0 if successful</p> <p>:CALibration[:ALL]? returns 1 if failed</p> <p>:CALibration[:ALL]? is the same as *CAL?</p> <p>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.</p> <p>This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command.</p> <p>Successful completion will clear bit 14 in the Status Questionable Calibration register.</p> <p>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.</p> |
| 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            | <p>Initializes the time for the Last Align Now, All Time.</p> <p>Records the temperature for the Last Align Now, All Temperature.</p> <p>If Align RF component succeeded, initializes the time for the Last Align Now, RF Time.</p> <p>If Align RF component succeeded, records the temperature for the Last Align Now, RF Temperature.</p>   |
| Instrument S/W Revision           | Prior to A.02.00  |
| Mode                              | All   |
| Remote Command                    | *CAL?   |
| Example                           | *CAL?   |
| Remote Command Notes              | <p>*CAL? returns 0 if successful</p> <p>*CAL? returns 1 if failed</p> <p>:CALibration[:ALL]? is the same as *CAL?</p> <p>See additional remarks described with :CALibration[:ALL]?</p>  |
| 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 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                          | <b>System, Alignments, Align Now</b>  |
| Mode                              | All   |
| Remote Command                    | :CALibration:NRF<br>:CALibration:NRF?   |
| Example                           | :CAL:NRF  |
| Remote Command Notes              | :CALibration:NRF? returns 0 if successful<br>:CALibration:NRF? returns 1 if failed<br><br>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.<br><br>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.<br><br>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.<br>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       | <b>System, Alignments, Align Now</b> |
| Mode           | All                                  |
| Remote Command | :CALibration:RF<br>:CALibration:RF?  |
| Example        | :CAL:RF                              |

## System Functions

### System

|                                   |  |
|-----------------------------------|--|
| Remote Command Notes              | <p>:CALibration:RF? returns 0 if successful</p> <p>:CALibration:RF? returns 1 if failed (including interfering user signal)</p> <p>While Align Now, RF is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register.</p> <p>This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command.</p> <p>Successful completion will clear bits 3, 11, and 12 in the Status Questionable Calibration register.</p> <p>A failure encountered during alignment will set the Error Condition “Align RF failed” and set bit 3 in the Status Questionable Calibration register.</p> <p>An interfering user signal will result in bits 11 and 12 to be set in the Status Questionable Calibration register to indicate Align Now, RF is required.</p> |
| Restriction and Notes             | <p>An interfering user supplied signal will result in the instrument requiring an Align Now, RF with the interfering signal removed.</p>   |
| SCPI Status Bits/OPC Dependencies | <p>Bits 11, 12, or 14 may be set in the Status Questionable Calibration register.</p>  |
| Dependencies/Couplings            | <p>Initializes the time for the Last Align Now, RF Time.</p> <p>Records the temperature for the Last Align Now, RF Temperature.</p>  |
| Instrument S/W Revision           | <p>Prior to A.02.00</p>  |

### 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                | <b>System, Alignments</b> |
| 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.

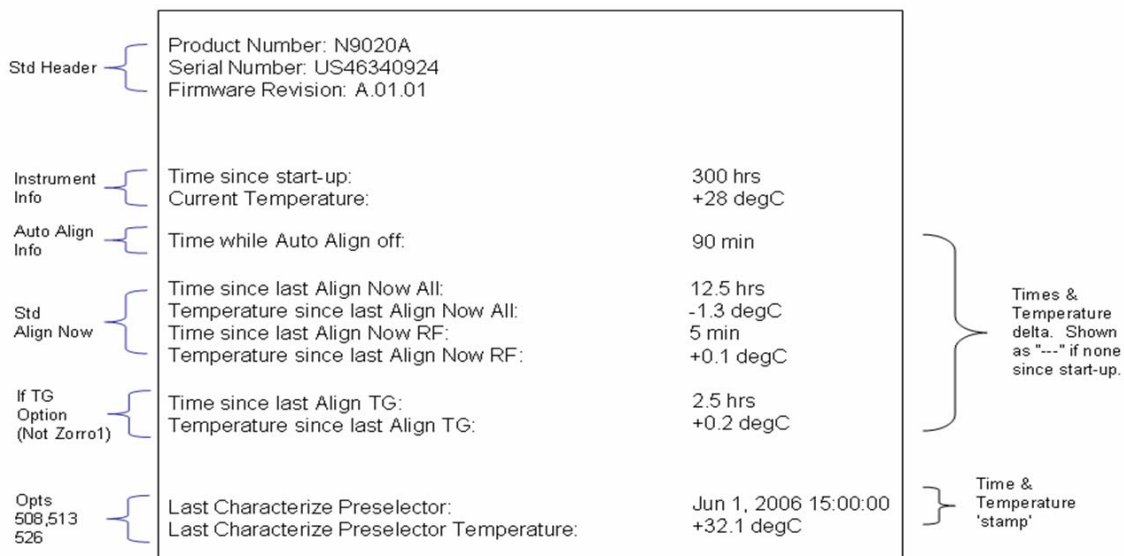
|                         |   |
|-------------------------|---|
| Key Path                | <b>System, Alignments, Align Now</b>  |
| Mode                    | All   |
| Remote Command          | :CALibration:YTF<br>:CALibration:YTF?   |
| Example                 | :CAL:YTF  |
| Remote Command Notes    | :CALibration:YTF? returns 0 if successful<br>:CALibration:YTF? returns 1 if failed (including interfering user signal)<br>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.<br>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.<br>Successful completion will clear bit 9 in the Status Questionable Calibration register.<br>A failure encountered during alignment will set the Error Condition “Characterize Preselector failed” and set bit 9 in the Status Questionable Calibration register.<br>For Option 507, 508, 513, and 526 only. |
| Dependencies/Couplings  | Initializes the time for the Last Characterize Preselector Time.<br>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:



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                | <b>System, Alignments</b>   |
| 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                | <b>Visual annotation in the Show Alignment Statistics screen</b>  |
| 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                | <b>Visual annotation in the Show Alignment Statistics screen</b>   |
| Mode                    | All  |
| Remote Command          | :CALibration:TEMPerature:CURRent?  |
| Example                 | :CAL:TEMP:CURR?  |
| Restriction and Notes   | Value is in degrees Centigrade.<br>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                | <b>Visual annotation in the Show Alignment Statistics screen</b>   |
| 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                | <b>Visual annotation in the Show Alignment Statistics screen</b>   |
| 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                | <b>Visual annotation in the Show Alignment Statistics screen</b>   |
| Mode                    | All  |
| Remote Command          | :CALibration:TIME:LRF?   |
| Example                 | :CAL:TIME:LRF?   |

System Functions  
System

|                         |  |
|-------------------------|--|
| 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                | <b>Visual annotation in the Show Alignment Statistics screen</b>   |
| 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                | <b>Visual annotation in the Show Alignment Statistics screen</b>   |
| 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                | <b>Visual annotation in the Show Alignment Statistics screen</b>   |
| 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                | <b>Visual annotation in the Show Alignment Statistics screen</b>   |
| 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                | <b>System, Alignments</b>  |
| Mode                    | All  |
| Remote Command          | :CALibration:FREquency:REFErence:MODE CALibrated USER<br>: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                | <b>System, Alignments, Timebase DAC</b> |
| Mode                    | All                                     |
| Example                 | :CAL:FREQ:REF:MODE CAL                  |
| Instrument S/W Revision | Prior to A.02.00                        |

## System Functions System

### User

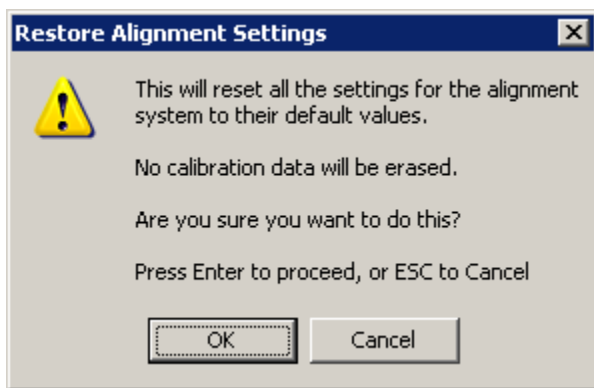
Allows setting the Timebase DAC to a value other than the value established during the factory or field calibration. The value displayed on the menu key is the calibrated value.

|                          |  |
|--------------------------|--|
| Key Path                 | <b>System, Alignments, Timebase DAC</b>  |
| Mode                     | All  |
| Example                  | :CAL:FREQ:REF:MODE USER  |
| Instrument S/W Revision  | Prior to A.02.00   |
| <br>                     |  |
| Key Path                 | <b>System, Alignments, Timebase DAC</b>  |
| Mode                     | All  |
| Remote Command           | :CALibration:FREQuency:REFerence:FINE <integer><br>: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   |
| <br>                     |  |
| Remote Command:          | :CALibration:FREQuency:REFerence:COARse <integer><br>: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:

| <b>Parameter</b>        | <b>Setting</b>   |
|-------------------------|--|
| 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   |
| <br>                    |  |
| Key Path                | <b>System, Alignments</b>  |
| 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.

---

### Backup or Restore Align Data...

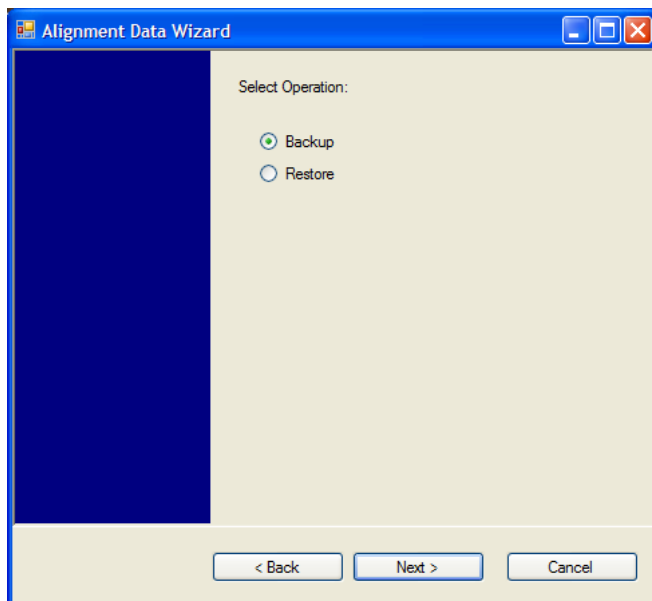
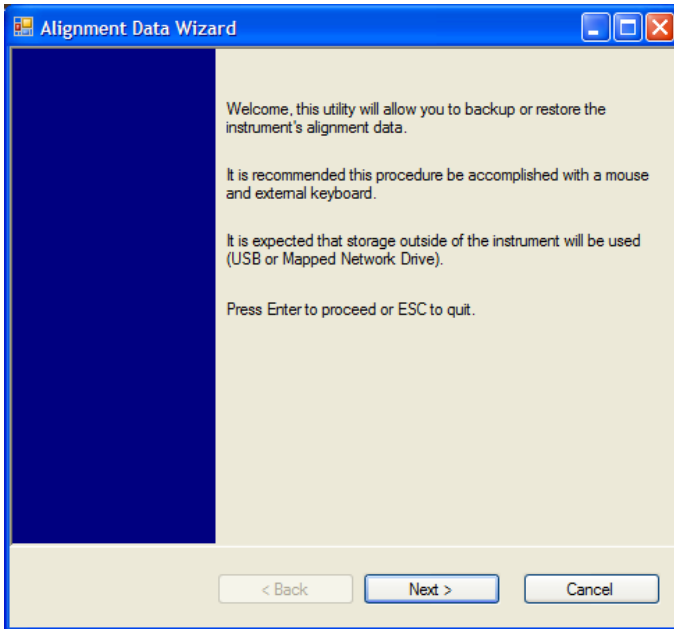
Opens the utility for backing-up or restoring the alignment data.

|                         |  |
|-------------------------|--|
| Key Path                | <b>System, Alignments</b>  |
| Instrument S/W Revision | A.02.00  |
| Key Path                | <b>System, Alignments</b>  |
| 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.

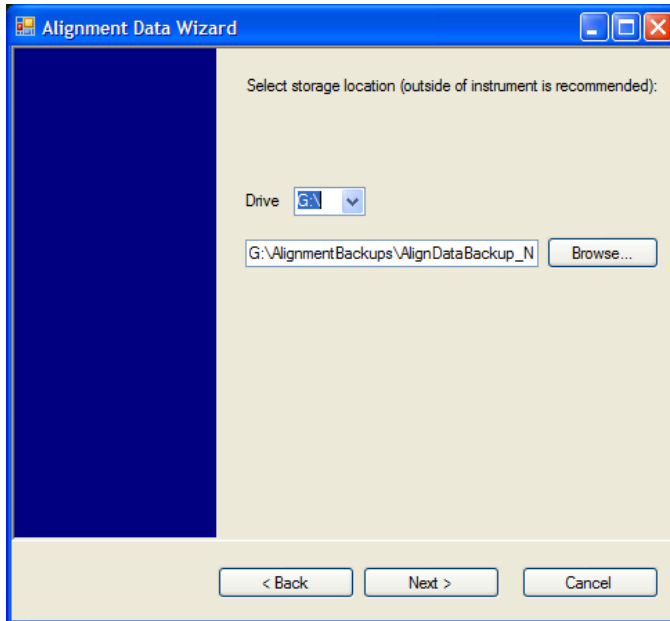
The following dialogue boxes operate without a mouse or external keyboard when you use the default file names.



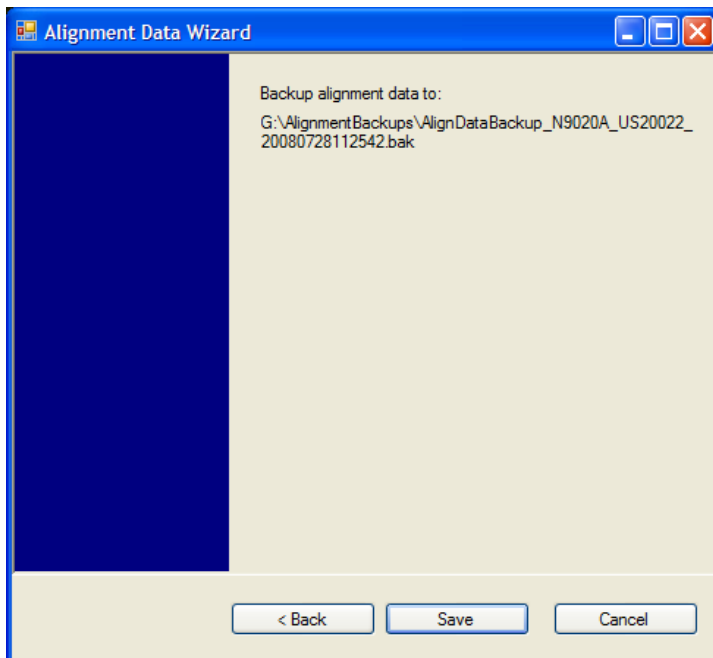
The backup screen will indicate the approximate amount of space required to contain the backup file.

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

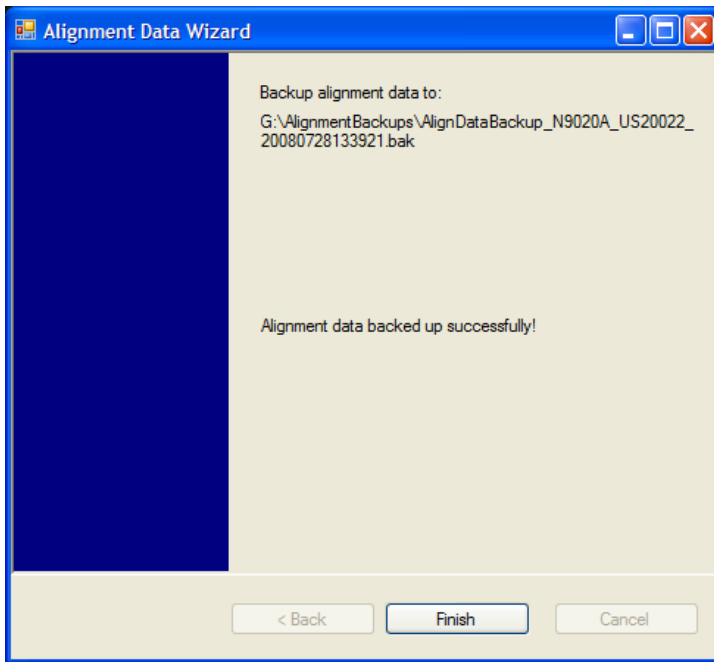
## System Functions System



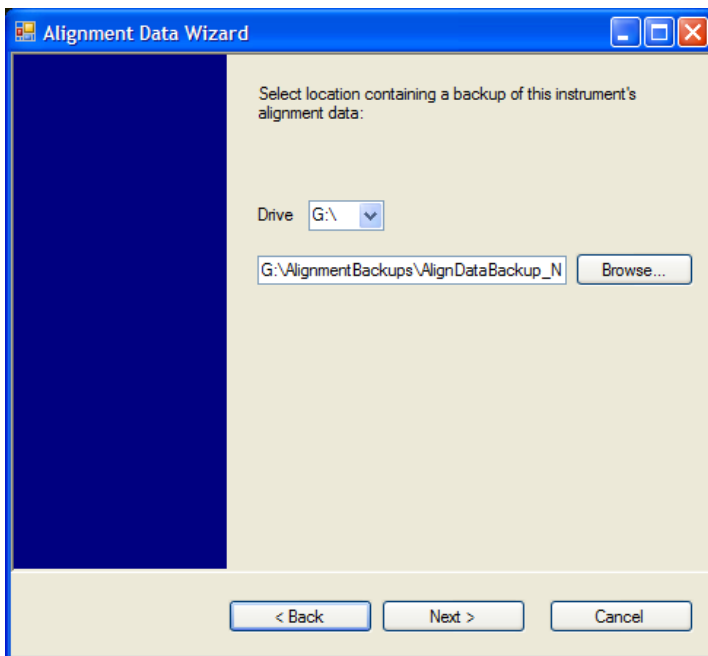
Changing the drive letter will also modify the path displayed in the box below. When this step is first loaded, the drive drop-down is populated with connected drives which provide you with write access. If there are many unreachable network drives connected to the instrument, this step can take a few 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.





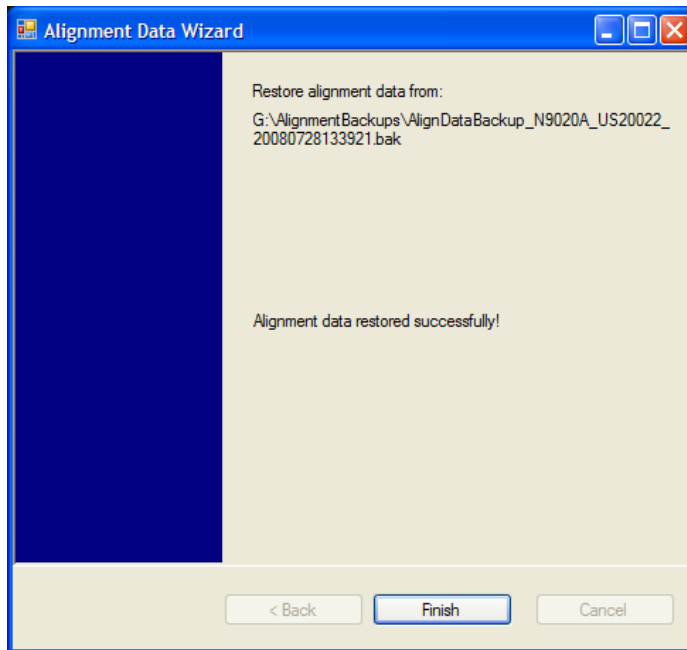
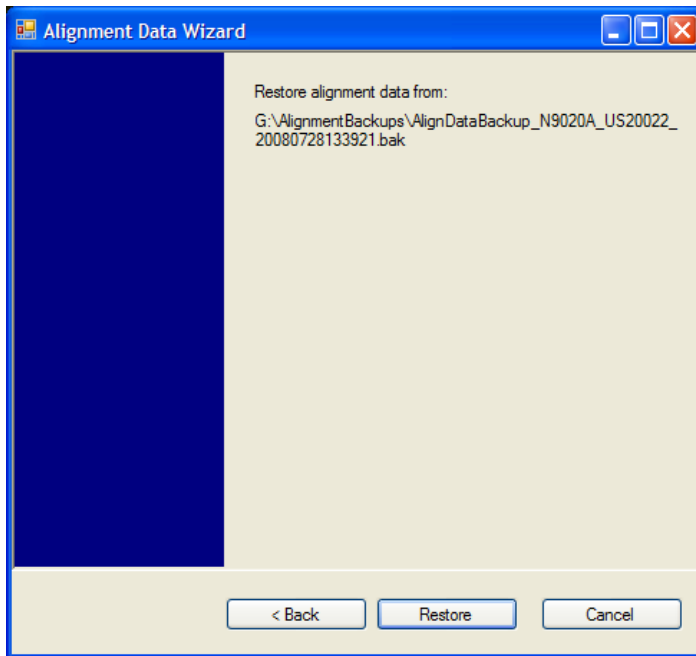


The restore operation will check the validity of the restore file using the database's built-in file validation. If the restore file is corrupt, the existing alignment data will remain in use.



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

## System Functions System



### 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?

## System Functions

### System

|                         |  |
|-------------------------|--|
| 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. |
| 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]<br>ON OFF 0 1<br><br>:SYSTem:COMMunicate:GPIB [1] [:SELF] :CONTroller[:ENABle]?  |
| Example        | :SYST:COMM:GPIB:CONT ON Will set GPIB port to Controller   |
| Key Path       | <b>System, I/O Config, GPIB</b>  |
| 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

## System Functions

### System

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                | <b>System, I/O Config, SCPI LAN</b>  |
| Mode                    | All  |
| Remote Command          | :SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle OFF ON 0 1<br>:SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle? |
| 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                   | <b>System, I/O Config, SCPI LAN</b>  |         |
| Mode                       | All  |         |
| Remote Command             | :SYSTem:COMMunicate:LAN:SCPI:SICL:ENABle OFF ON 0 1<br>: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:CONNecTion? |
| Example        | :SYST:COMM:USB:CONN?                |

## System Functions System

|                         |   |
|-------------------------|---|
| Remote Command Notes    | NONE – Indicates no USB connection has been made.<br><br>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.<br><br>HSPeed – Indicates that a USB high speed connection (480 Mbps) has been negotiated.<br><br>FSPeed – Indicates that a USB full speed connection (12 Mbps) has been negotiated. |
| 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?   |
| Example                 | :SYST:COMM:USB:STAT?  |
| Remote Command Notes    | SUSPended – Indicates that the USB bus is currently in its suspended state. The bus is in the suspended state when:<br><br>The bus is not connected to any controller<br>The controller is currently powered off<br>The controller has explicitly placed the USB device into the suspended state.<br>When in the suspended state, no USB activity, including start of frame packets are received.<br><br>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. |
| 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    | 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.<br><br>The packet count is initialized to 0,0 when the instrument application is started. |
| 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                | <b>System, I/O Config</b> |
| Instrument S/W Revision | Prior to A.02.00          |

## LAN Reset

This key resets the LAN connection.

|                         |                                |
|-------------------------|--------------------------------|
| Key Path                | <b>System, I/O Config, LXI</b> |
| 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 \(Remote Command Only\)” on page 209](#)“Domain (Remote Command Only)” on page 209).

|                |  |
|----------------|--|
| Key Path       | <b>System, I/O Config, LXI</b>   |
| Remote Command | :LXI:EVENT:DOMain <intDomain><br>:LXI:EVENT:DOMain?  |
| Example        | :LXI:EVENT:DOM 128<br>:LXI:EVENT: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.   |

## System Functions System

|                         |                  |
|-------------------------|------------------|
| 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                | <b>System, I/O Config, LXI</b> |
| 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                | <b>System, I/O Config, LXI, LXI Output LAN Events</b> |
| 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 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       | <b>System, I/O Config, LXI, LXI Output LAN Events</b>  |
| Remote Command | :LXI:EVENT[:OUTPut]:LAN:LIST?  |
| Example        | :LXI:EVEN:LAN:LIST?<br><br>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.<br><br>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 Command 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:EVENT:LAN:ADD "LANEVENT"   |
| Restriction and Notes:   | The maximum length of the string is 16 characters.<br>Longer strings are concatenated and added to the LXI Output LAN Event list.<br>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 Command 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:EVENT:LAN:REM "LANEVENT"  |
| Restriction and Notes:   | The maximum length of the string is 16 characters.<br>Longer strings are concatenated and the resulting LAN Event is removed from the LXI Output LAN Event list.<br>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   |

## System Functions

### System

#### Remove All (Remote Command 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”
- “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",<br>"SourceEvent"<br><br>: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.<br><br>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 Command 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<br>"LANEVENT", "destinationExpression"<br><br>: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:<br><br>:SYSTem:DEFault INPut                       |
| State Saved:             | Saved in instrument state.  |
| Range:                   | Uppercase, Lowercase, Numeric, Symbol   |
| Instrument S/W Revision: | Prior to A.02.00  |

## System Functions System

### 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                | <b>System, I/O Config, LXI, LXI Output LAN Events, LAN[n]</b>  |
| Remote Command          | :LXI:EVENT[:OUTPut]:LAN[:SET]:DRIVE "LANEVENT",<br>OFF NORMal WOR<br><br>:LXI:EVENT[:OUTPut]:LAN[:SET]:DRIVE? "LANEVENT"   |
| Example                 | :LXI:EVENT:LAN:DRIVE "LANEVENT",WOR  |
| Preset                  | Not affected by a Preset. The default value of "NORMal" can be restored by using the command:<br><br>: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.

| <b>Instrument Event Edge</b> | <b>Slope Parameter</b> | <b>Drive Parameter</b> | <b>Action</b> |
|------------------------------|------------------------|------------------------|---------------|
| 0                            | Negative               | Off                    | Not sent      |
| 0                            | Positive               | Off                    | Not sent      |
| 1                            | Negative               | Off                    | Not sent      |
| 1                            | Positive               | Off                    | Not sent      |
| 0                            | Negative               | Normal                 | 1             |
| 0                            | Positive               | Normal                 | 0             |
| 1                            | Negative               | Normal                 | 0             |
| 1                            | Positive               | Normal                 | 1             |

| Instrument Event Edge | Slope Parameter | Drive Parameter | Action   |
|-----------------------|-----------------|-----------------|----------|
| 0                     | Negative        | Wired OR        | 1        |
| 0                     | Positive        | Wired OR        | Not sent |
| 1                     | Negative        | Wired OR        | Not sent |
| 1                     | Positive        | Wired OR        | 0        |

|                         |  |
|-------------------------|--|
| Key Path                | <b>System, I/O Config, LXI, LXI Output LAN Events, LAN[n]</b>  |
| Remote Command          | :LXI:EVENT[:OUTPut]:LAN[:SET]:SLOPe "LANEVENT",<br>POSitive NEGative<br>:LXI:EVENT[:OUTPut]:LAN[:SET]:SLOPe? "LANEVENT"  |
| Example                 | :LXI:EVEN:LAN:SLOP "LANEVENT",POS  |
| Preset                  | Not affected by a Preset. The default value of "Positive" can be restored by using the command:<br>: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                | <b>System, I/O Config, LXI, LXI Output LAN Events, LAN[n]</b>   |
| Remote Command          | :LXI:EVENT[:OUTPut]:LAN[:SET]:TSDelta "LANEVENT",<br><seconds><br>:LXI:EVENT[:OUTPut]:LAN[:SET]:TSDelta? "LANEVENT"   |
| Example                 | :LXI:EVEN:LAN:TSD "LANEVENT",10.5 s   |
| Preset                  | Not affected by a Preset. The default value of "0.0 s" can be restored by using the command:<br>: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                | <b>System, I/O Config, LXI, LXI Output LAN Events, LAN[n]</b>  |
| Remote Command          | :LXI:EVENT[:OUTPut]:LAN[:SET]:ENABLEd<br>"LANEVENT", ON OFF 1 0<br><br>: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:<br><br>: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 Command 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 Command Only)

Allows the configuration of some of the above parameters from a single SCPI command.

|                          |  |
|--------------------------|--|
| Remote Command:          | :LXI:EVENT[:OUTPut]:LAN[:SET]:CONFigure<br>"lanEvent", <enabled>, <source>, <slope>, <drive>,<br><destination> |
| Example:                 | :LXI:EVEN:LAN:CONF<br>"LAN0",1,"WaitingForTrigger",POS,NORM,"ALL"  |
| Instrument S/W Revision: | Prior to A.02.00   |

### Send (Remote Command 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 Command Only)

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

Remote Command: :LXI:EVENT[:OUTPut]:LAN[:SET]:IDENTifier "LANEVENT",  
"identifier"

:LXI:EVENT[:OUTPut]:LAN[:SET]:IDENTifier? "LANEVENT"

Example: :LXI:EVENT:LAN:IDEN"LAN0","debugstring"

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 Command Only)

#### Time

#### Epoch Time (Remote Command 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

## System Functions

### System

|                          |   |
|--------------------------|---|
| Range:                   | Seconds: 0.0 – 1.7976931348623157 x 10308 s (Max Double)<br>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.<br>Ignored when the device is not selected as the IEEE 1588 master clock.<br>The fractional portion is only accurate to the microseconds position.<br>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)<br>Fraction: 0.0 s – 0.999999 s  |
| Instrument S/W Revision: | Prior to A.02.00  |

#### Seconds (Remote Command 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><br>: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.<br>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:<br>: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 Command 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><br>: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.<br>Only accurate to the microseconds position. |
| Preset:                  | Sub-second value of system time   |
| State Saved:             | No  |
| Range:                   | [0.0,1.0)   |
| Instrument S/W Revision: | Prior to A.02.00  |

### Local Time (Remote Command 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 Command Only)

Enables you to set the leap second offset between the UTC and TAI time standards.

|                          |   |
|--------------------------|---|
| Remote Command:          | :LXI:CLOCK[:TIME]:LSOffset <integer><br>: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 Command 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 Command Only)

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

Remote Command:                   : LXI : CLOCk [ : TIME ] : TZONe ?  
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 Command 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 Command 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 Command 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 Command Only)

Clears the recorded PTP time marker used to measure against the current PTP time. There are 9 available markers with indices 1 – 9.

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

Example:                           : LXI : CLOC : MARK1 : 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 Command 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 Command 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 Command 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 Command Only)

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

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

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

Remote Command: :LXI:CLOCK:PTP:ACCuracy  
 NS25|NS100|NS250|NS1000|NS2500|US10|US25|US100|US250|US  
 1000|US2500|MS10|MS25|MS100|MS1000|S10|GT10S|UNKNown  
 :LXI:CLOCK:PTP:ACCuracy?

Example: :LXI:CLOC:PTP:ACC US25

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|US  
 2500|MS10|MS25|MS100|MS1000|S10|GT10S|UNKNown

Instrument S/W Revision: Prior to A.02.00

#### Announce Interval (Remote Command Only)

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

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

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

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 Command 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 Command 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 Command 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 Command Only)

The instrument synchronizes its clock only with other clocks in the same domain.

|                          |  |
|--------------------------|--|
| Remote Command:          | :LXI:CLOCK:PTP:DOMain <domainNumber><br>: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:<br>SYSTem:DEFault INPut |
| Min:                     | 0  |
| Max:                     | 127  |
| Instrument S/W Revision: | Prior to A.02.00   |

### Offset (Remote Command Only)

Returns the difference between the instrument clock PTP time and the Master clock PTP time.

|                          |  |
|--------------------------|--|
| Remote Command:          | :LXI:CLOCK:PTP:OFFSet?                                   |
| Example:                 | :LXI:CLOC:PTP:OFFS?                                      |
| Range:                   | 0.0 to $-1.7976931348623157 \times 10308$ s (Min Double) |
| Instrument S/W Revision: | Prior to A.02.00   |

### First Priority (Remote Command 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><br>: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:<br>SYSTem:DEFault INPut |
| Min:                     | 0  |
| Max:                     | 255  |
| Instrument S/W Revision: | Prior to A.02.00   |

### Second Priority (Remote Command 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 Command 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 Command 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 Command 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 Command 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 Command 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

## System Functions System

Max:  $2^{32} = 4294967296$  s  
Instrument S/W Revision: Prior to A.02.00

### Grand Master Accuracy (Remote Command 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 Command Only)

Returns the Grand Master's MAC Address.

Remote Command: `:LXI:CLOCK:PTP:GMASter:MADDress?`  
Example: `:LXI:CLOC:PTP:GMAS:MADD?` For example, this might return "00-00-50-1e-ca-ad".  
Range: Uppercase, Lowercase, Numeric, Symbol  
Instrument S/W Revision: Prior to A.02.00

### Traceability (Remote Command 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 Command Only)

Returns the Master's MAC Address.

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

### Servo Algorithm (Remote Command Only)

The Servo Algorithm parameters are considered advanced settings for tweaking IEEE 1588 performance.

#### Log (Remote Command 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 Command 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 Command 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 Command 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:FBENry

Example: LXI:CLOCK:SALG:LOG:CIRC:FBEN

Instrument S/W Revision: Prior to A.02.00

### Clear (Remote Command Only)

Clears all entries from the Servo Log.

Remote Command: :LXI:CLOCK:SALGorithm:LOG:CLEar

Example: :LXI:CLOC:SALG:LOG:CLE

Instrument S/W Revision: Prior to A.02.00

### Count (Remote Command 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 Command 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 Command 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 Command 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 Command 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 Command 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:CLOCK: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 Command Only)

Resets the long-term servo performance statistics.

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

Example: :LXI:CLOCK: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 Command 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:CLOCK:SALG:ASYM 15 ns

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 Command 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<br><secondsSquared><br>:LXI:CLOCK:SALGORITHM[:SET]:CFTHRESHOLD?                 |
| Example:                 | :LXI:CLOCK:SALG:CFTH 0.25   |
| Preset:                  | Not affected by a Preset. The default value of "1.0e-11 " can be restored by using the command:<br>SYSTEM:DEFAULT INPUT |
| Min:                     | 0   |
| Max:                     | 1   |
| Instrument S/W Revision: | Prior to A.02.00  |

### Coarse Proportional Constant (Remote Command 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><br>:LXI:CLOCK:SALGORITHM[:SET]:CPCONSTANT?                   |
| Example:                 | :LXI:CLOCK:SALG:CPC 0.5   |
| Preset:                  | Not affected by a Preset. The default value of "0.4 " can be restored by using the command:<br>SYSTEM:DEFAULT INPUT |
| Min:                     | 0   |
| Max:                     | 1   |
| Instrument S/W Revision: | Prior to A.02.00  |

### Coarse Integral Constant (Remote Command 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 : CLOC : 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 Command Only)

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

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

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

Example:                               : LXI : CLOC : SALG : FPC 1

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 Command Only)

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

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

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

Example:                               : LXI: CLOC: SALG: FIC 0.6

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 Command 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



Max: 10.0  
Instrument S/W Revision: Prior to A.02.00

### Configure (Remote Command 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 Command Only)

#### Master (Remote Command Only)

Reports whether or not the device has been selected as the PTP master clock.

Remote Command: :LXI:CLOCK:SYNC:MASTer?  
Example: :LXI:CLOC:SYNC:MAST?  
Range: ON|OFF|0|1  
Instrument S/W Revision: Prior to A.02.00

#### Local Enabled (Remote Command 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 Command Only)

The local clock is updated after the time set in the Local Interval elapses.

|                          |  |
|--------------------------|--|
| Remote Command:          | :LXI:CLOCK:SYNC:LOCAL:INTERVAL<br>: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:<br>SYSTem:DEFault INPut |
| Min:                     | 0  |
| Max:                     | 3600   |
| Instrument S/W Revision: | Prior to A.02.00   |

### Instrument Status Events

#### Enable (Remote Command 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"<br>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 Command 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"<br>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 Command Only)

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

|                          |                                  |
|--------------------------|----------------------------------|
| Remote Command:          | :LXI:EVENT:INPut:LAN:DISable:ALL |
| Example:                 | :LXI:EVEN:INP:LAN:DIS:ALL        |
| Instrument S/W Revision: | Prior to A.02.00                 |

### Add (Remote Command 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.<br>Longer strings are concatenated and added to the LXI Input LAN Event list.<br>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 Command 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.<br>Longer strings are concatenated and the resulting LAN Event is removed from the LXI Input LAN Event list.<br>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 Command Only)

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

|                          |   |
|--------------------------|---|
| Remote Command:          | :LXI:EVENT:INPut:LAN:REMOve:ALL   |
| Example:                 | :LXI:EVEN:INP:LAN:REM:ALL   |
| Restriction and Notes:   | Only LAN Events added with the Add command are removed. Default events cannot be removed. |
| Instrument S/W Revision: | Prior to A.02.00  |

### Filter (Remote Command 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"<br>:LXI:EVENT:INPut:LAN:FILTer?              |
| Example:                 | :LXI:EVEN:INP:LAN:FILT "LAN0", "agilent.com"<br>:LXI:EVEN: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 Command 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:          | <code>:LXI:EVENT:INPut:LAN:IDENtifier "LANEVENT","identifier"</code><br><code>:LXI:EVENT:INPut:LAN:IDENtifier? "LANEVENT"</code>   |
| Example:                 | <code>:LXI:EVEN:INP:LAN:IDEN "LAN0","debugstring"</code>   |
| Restriction and Notes:   | The maximum length of the string is 16 characters.<br>Nothing happens if the LAN event does not exist.<br>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 Command 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:          | <code>:LXI:EVENT:INPut:LAN[:SET]:DETEction "LANEVENT",<br/>HIGH LOW RISE FALL</code>   |
| Example:                 | <code>:LXI:EVENT:INP:LAN:DET "LANEVENT",HIGH</code>  |
| 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:<br><code>:SYSTem:DEFault INPut</code> |
| State Saved:             | Saved in instrument state.   |
| Range:                   | HIGH   LOW   RISE   FALL   |
| Instrument S/W Revision: | Prior to A.02.00   |
| Remote Command:          | <code>:LXI:EVENT:INPut:LAN[:SET]:DETEction? "LANEVENT"</code>  |

|                          |  |
|--------------------------|--|
| 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 Command 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:INP:LAN[:SET]:ENABled<br>"LANEVENT", ON   OFF   1   0   |
| Example:                 | :LXI:EVENT:INP:LAN:ENAB "LAN0",1   |
| Preset:                  | Not affected by a Preset. The default value of "OFF" can be restored by using the remote command:<br>:SYSTEM:DEFAULT INP |
| State Saved:             | Saved in instrument state.   |
| Range:                   | 1 0  |
| Instrument S/W Revision: | Prior to A.02.00   |

|                          |  |
|--------------------------|--|
| Remote Command:          | :LXI:EVENT:INP:LAN[:SET]:ENABled? "LANEVENT" |
| Example:                 | :LXI:EVENT: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 Command Only)

Returns the number of items in the LXI Input LAN Event List.

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

### List (Remote Command 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?<br>Returns "LAN0", "LAN1", "LAN2", "LAN3", "LAN4", "LAN5", "LAN6",<br>"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 Command Only)

Allows the configuration of some of the above parameters from a single SCPI command.

|                          |   |
|--------------------------|---|
| Remote Command:          | :LXI:EVENT:INPut:LAN[:SET]:CONFigure "lanEvent",<br><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

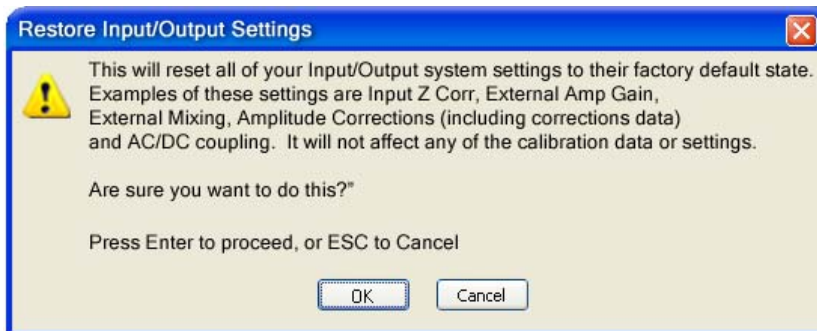
Provides incremental initialization of the system setting groups along with supporting a comprehensive reset of the entire instrument back to a factory default state. The menu selections are the groups of system settings and when one is selected, that particular group of system settings is reset back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

|                         |  |
|-------------------------|--|
| Key Path                | <b>System</b>  |
| 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:

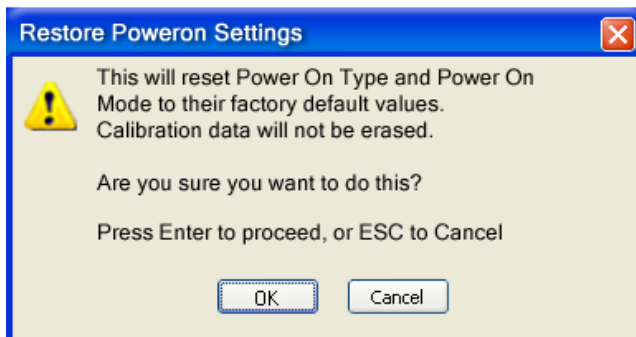


|                         |  |
|-------------------------|--|
| Key Path                | <b>System, Restore System Defaults</b> |
| Example                 | :SYST:DEF INP                          |
| Instrument S/W Revision | Prior to A.02.00                       |

### 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:



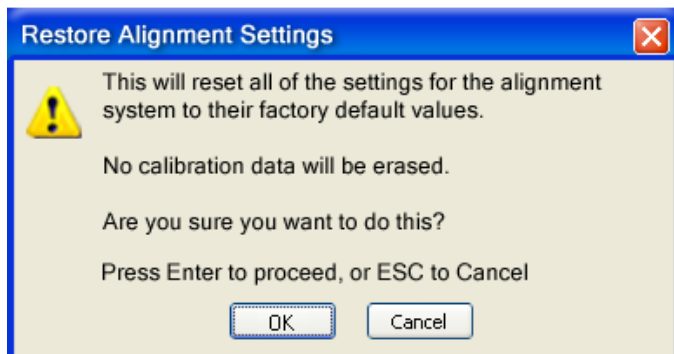
|                         |  |
|-------------------------|--|
| Key Path                | <b>System, Restore System Defaults</b> |
| Example                 | :SYST:DEF PON                          |
| Instrument S/W Revision | Prior to A.02.00                       |

### 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:



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

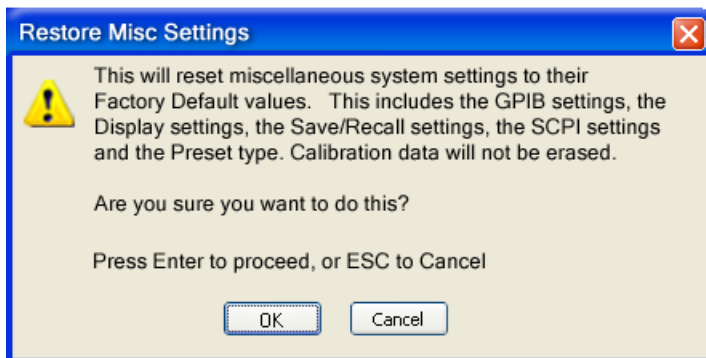
### Restore Misc Defaults

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            |

| Miscellaneous Setting | Default Value |
|-----------------------|---------------|
| 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:

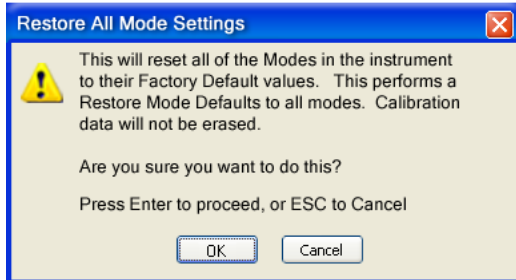


|                         |  |
|-------------------------|--|
| Key Path                | <b>System, Restore System Defaults</b> |
| Example                 | :SYST:DEF MISC                         |
| Instrument S/W Revision | Prior to A.02.00                       |

### 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:

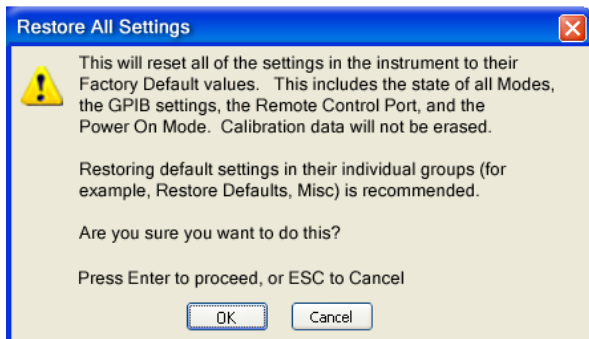


|                         |  |
|-------------------------|--|
| Key Path                | <b>System, Restore System Defaults</b>   |
| Example                 | :SYST:DEF MOD  |
| Dependencies/Couplings  | An All Mode will cause the currently running measurement to be aborted, mode switch to the power-on 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 | <b>System, Restore System Defaults</b> |
|----------|--|



|                         |   |
|-------------------------|---|
| 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                | <b>System</b>                   |
| 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                | <b>System</b>                              |
| 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<br>"N9073A-1FP", "027253AD27F83CDA5673A9BA5F427FDA5E4F25AEB1<br>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.<br><br>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">  |

## System Functions

### System

- Example: SYST:LKEY:DEL  
"N9073A-1FP","027253AD27F83CDA5673A9BA5F427FDA5E4F25AEB1017638211AC9F60D9C639FE539735909C551DE0A91"
- 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
- Remote Command: :SYSTem:LKEY:LIST?
- Remote Command Notes: Return Value:  
An <arbitrary block data> of all the installed instrument licenses.  
The format of each license is as follows.  
<Feature>,<Version>,<Signature>,<Expiration Date>,<Serial Number for Transport>  
Return Value Example:  
#3136  
N9073A-1FP,1.000,B043920A51CA  
N9060A-2FP,1.000,4D1D1164BE64  
N9020A-508,1.000,389BC042F920  
N9073A-1F1,1.000,5D71E9BA814C,13-aug-2005  
<arbitrary block data> is:  
#NMMM<data>  
Where:  
N is the number of digits that describes the number of MMM characters. For example if the data was 55 bytes, N would be 2.  
MMM would be the ASCII representation of the number of bytes. In the previous example, N would be 55.  
<data> ASCII contents of the data
- Instrument S/W Revision: Prior to A.02.00
- Remote Command: :SYSTem:LKEY? <"OptionInfo">
- Example: SYST:LKEY? "N9073A-1FP"

|                          |   |
|--------------------------|---|
| Remote Command Notes:    | The <"OptionInfo"> contains the feature and the version. You must specify the feature but can omit the version. If you omit the version, the system regards it as the latest one. |
|                          | Return Value:<br><"LicenseInfo"> if the license is valid, null otherwise.<br><"LicenseInfo"> contains the signature, the expiration date, and serial number if transportable.     |
|                          | Return Value Example:<br>"B043920A51CA"   |
| 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?   |
| 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                | <b>System</b>    |
| 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                | <b>System, More</b> |
| 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 | 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     |
| Odometer          | High operating temperature extreme: | +37.2degC |
|                   | Low operating temperature extreme   | +18.1degC |
|                   | 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                | <b>System, Diagnostics</b>  |
| 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  |
| Restriction and Notes:   | The return value is a comma separated list of the individual counts for each mechanical relay.<br><br>The position of the relays in the list is:<br><br>“<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   |

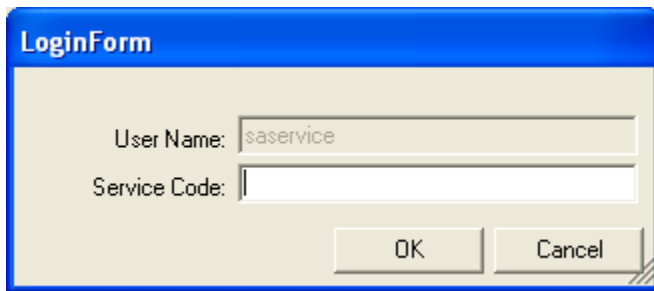
### Query the Elapsed Time since 1st power on

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

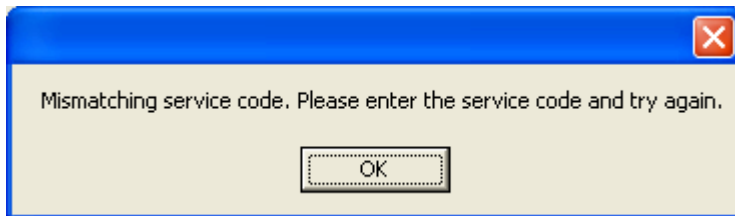
Remote Command:                   :SYSTem: PON: ETIMe?  
 Example:                            :SYST:PON:ETIM?  
 Remote Command Notes:        Query Only  
 Instrument S/W Revision:       Prior to A.02.00

### 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                | <b>System, Diagnostics</b>                       |
| Restriction and Notes   | <b>Password is required to access this menu.</b> |
| 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:<br>"503,P03,PFR"<br>: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<br>: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>"<br>:SYSTem:TIME?   |
| Example                 | :SYST:TIME "13,05,26"  |
| Remote Command Notes    | <hour> is the two digit representation of the hour in 24 hour format<br><minute> is the two digit representation of minute<br><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                | <b>Front-panel key</b> |
| 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:PRESet: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       | <b>User Preset</b>  |
| Remote Command | :SYSTem:PRESet:USER |

## System Functions

### User Preset

|                         |  |
|-------------------------|--|
| Example                 | : SYST: PRES: USER: SAVE<br>: 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              | <b>User Preset</b>   |
| Remote Command        | : SYSTem: PRESet: USER: ALL  |
| Example               | : SYST: PRES: USER: SAVE<br>: SYST: PRES: USER: ALL                                  |
| 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, 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                | <b>User Preset</b>  |
| 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  |

System Functions  
**User Preset**

For the AM Demod measurement, the analyzer will return the metrics results, such as AM depth, modulation rate, SINAD, total harmonic distortion and carrier power. The analyzer can display trace data of the RF spectrum, the AF spectrum, or the demod waveform.

If Demod Min trace, Demod Max trace or Demod Average trace is queried using a Meas, Read or Fetch command when the Average/Hold feature is turned off, the resulting data will be default values.

This topic contains the following sections:

[“Measurement Commands for AM Demod” on page 247](#)

[“Remote Command Results for AM Demod” on page 247](#)

## Measurement Commands for AM Demod

**Remote Command:** :MEASure|READ|FETCh:AM[1]|0|2|3|4|5|6?

Example:  
 MEAS:AM?  
 FETCh:AM0?  
 READ:AM5?

## Remote Command Results for AM Demod

| Command               | n   | Return Value  |
|-----------------------|-----|---|
| INITiate:AM           | n/a | n/a   |
| CONFigure?            | n/a | name of current measurement: "AM"   |
| CONFigure:AM          | n/a | n/a (selects AM measurement in Meas Preset state)   |
| CONFigure:AM:NDEFault | n/a | n/a (selects AM measurement without affecting settings)   |
| FETCh:AM[n]?          | 0   | This query returns the RF Spectrum trace data as a list of x,y pairs. The x-axis values are in units of Hz. The y-value units depend on the current view. |
| MEASure:AM[n]?        |     |   |
| READ:AM[n]?           |     |   |

- not specified or n=1 Returns the following comma-separated results. All modulation depth numbers are in units of percent.  
 The RF Spectrum window's center frequency  
 Carrier Power  
 0  
 Modulation Rate  
 SINAD value  
 Distortion/Total Vrms (% - not ratio - or dB)  
 Total Harmonic Distortion (% - not ratio - or dB)  
 Modulation Depth (Peak+)  
 Modulation Depth (Peak-)  
 Modulation Depth (Pk-Pk)/2  
 Modulation Depth (RMS)  
 Modulation Depth (Peak+) Max Hold  
 Modulation Depth (Peak-) Max Hold  
 Modulation Depth (Pk-Pk)/2 Max Hold  
 Modulation Depth (RMS) Max Hold
- 2 This query returns the Demod Min Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view  
 If Aver/Hold is off, all values are 10,000.
- 3 This query returns the Demod Max Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view  
 If Aver/Hold is off, all y-values are -100.
- 4 This query returns the Demod Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view
- 5 This query returns the Demod Average Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view  
 If Aver/Hold is off, all y-values are -100.
- 6 This query returns the AF Spectrum Trace data as a list of x,y pairs. The x-axis values are in units of Hz. The y-value units depend on the current view

Key Path

**Meas**

Instrument S/W Revision

Prior to A.02.00



For the FM Demod measurement, the analyzer will display the metrics results, such as FM deviation, modulation rate, carrier frequency error, SINAD, total harmonic distortion and carrier power. The analyzer can also display trace data of the RF spectrum, the AF spectrum, or the demod waveform.

If Demod Min trace, Demod Max trace or Demod Average trace is queried using a Meas, Read or Fetch command when Average/Hold feature is turned off, the resulting data will be default values.

If any of the metrics are off, a SCPI query will return NaN and show “---” in the metrics window. The metrics that can be turned off are: Modulation Rate, SINAD, Distortion, THD and all but one of the Deviations.

This topic contains the following sections:

[“Measurement Commands for FM Demod ” on page 249](#)

[“Remote Command Results for FM Demod” on page 249](#)

## Measurement Commands for FM Demod

**Remote Command:** :MEASure|READ|FETCh:FM[1]|0|2|3|4|5?

Example: MEAS:FM?  
FETCh:FM0?  
READ:FM5?

## Remote Command Results for FM Demod

| Command               | N   | Return Value   |
|-----------------------|-----|--|
| INITiate:FM           | n/a | n/a  |
| CONFigure?            | n/a | name of current measurement: "FM"  |
| CONFigure:FM          | n/a | n/a (selects FM measurement in Meas Preset state)  |
| CONFigure:FM:NDEFault | n/a | n/a (selects FM measurement without affecting settings)  |
| FETCh:FM[n]?          | 0   | This query returns the RF Spectrum trace data as a list of x,y pairs. The x-axis values are in units of Hz. The y-value units depend on the current view |
| MEASure:FM[n]?        |     |  |
| READ:FM[n]?           |     |  |

- not specified or n=1 Returns the following comma-separated results:  
 The RF Spectrum window's center frequency  
 Carrier Power  
 Carrier Frequency Error  
 Modulation Rate  
 SINAD value  
 Distortion/Total Vrms (% - not ratio - or dB)  
 Total Harmonic Distortion(% - not ratio - or dB)  
 Deviation (Peak+)  
 Deviation (Peak-)  
 Deviation (Pk-Pk)/2  
 Deviation (RMS)  
 Deviation (Peak+) Max Hold  
 Deviation (Peak-) Max Hold  
 Deviation (Pk-Pk)/2 Max Hold  
 Deviation (RMS) Max Hold
- 2 This query returns the Demod Min Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view  
 If Aver/Hold is off, all y-values are 1 GHz.
- 3 This query returns the Demod Max Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view  
 If Aver/Hold is off, all y-values are -1 GHz.
- 4 This query returns the Demod Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view
- 5 This query returns the Demod Average Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view  
 If Aver/Hold is off, all y-values are -1 GHz.
- 6 This query returns the AF Spectrum Trace data as a list of x,y pairs. The x-axis values are in units of Hz. The y-value units depend on the current view

Key Path

**Meas**

Instrument S/W Revision

Prior to A.02.00

For the PM Demod measurement, the analyzer will display the metrics results, such as deviation, modulation rate, carrier frequency error, SINAD, total harmonic distortion and carrier power. The analyzer can also display trace data of the RF spectrum, the AF spectrum, or the demod waveform.

If Demod Min trace, Demod Max trace or Demod Average trace is queried using a Meas, Read or Fetch command when the Average/Hold feature is turned off, the resulting data will be default values.

If any of the metrics are off, a SCPI query will return NaN and show “---” in the metrics window. The metrics that can be turned off are: Modulation Rate, SINAD, Distortion, THD and all but one of the Deviations.

This topic contains the following sections:

[“Measurement Commands for PM Demod” on page 251](#)

[“Remote Command Results for PM Demod” on page 251](#) Results for PM Demod

### Measurement Commands for PM Demod

**Remote Command:** :MEASure|READ|FETCh:PM[1]|0|2|3|4|5?

Example: MEAS:PM?  
FETCh:PM0?  
READ:PM5?

### Remote Command Results for PM Demod

| Command               | N   | Return Value   |
|-----------------------|-----|--|
| INITiate:PM           | n/a | n/a  |
| CONFigure?            | n/a | name of current measurement: "PM"  |
| CONFigure:PM          | n/a | n/a (selects PM measurement in Meas Preset state)  |
| CONFigure:PM:NDEFault | n/a | n/a (selects PM measurement without affecting settings)  |
| FETCh:PM[n]?          | 0   | This query returns the RF Spectrum trace data as a list of x,y pairs. The x-axis values are in units of Hz. The y-value units depend on the current view |
| MEASure:PM[n]?        |     |  |
| READ:PM[n]?           |     |  |

|                      |   |
|----------------------|---|
| not specified or n=1 | <p>Returns the following comma-separated results:</p> <p>The RF Spectrum window's center frequency</p> <p>Carrier Power</p> <p>Carrier Frequency Error</p> <p>Modulation Rate</p> <p>SINAD value</p> <p>Distortion/Total Vrms (% - not ratio - or dB)</p> <p>Total Harmonic Distortion(% - not ratio - or dB)</p> <p>Deviation (Peak+)</p> <p>Deviation (Peak-)</p> <p>Deviation (Pk-Pk)/2</p> <p>Deviation (RMS)</p> <p>Deviation (Peak+) Max Hold</p> <p>Deviation (Peak-) Max Hold</p> <p>Deviation (Pk-Pk)/2 Max Hold</p> <p>Deviation (RMS) Max Hold</p> |
| 2                    | <p>This query returns the Demod Min Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view</p> <p>If Aver/Hold is off, all y-values are 10k.</p>  |
| 3                    | <p>This query returns the Demod Max Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view</p> <p>If Aver/Hold is off, all y-values are -10k.</p>   |
| 4                    | <p>This query returns the Demod Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view</p>  |
| 5                    | <p>This query returns the Demod Average Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view</p> <p>If Aver/Hold is off, all y-values are -10k.</p>   |
| 6                    | <p>This query returns the AF Spectrum Trace data as a list of x,y pairs. The x-axis values are in units of Hz. The y-value units depend on the current view</p>   |

|                         |                  |
|-------------------------|------------------|
| Key Path                | <b>Meas</b>      |
| Instrument S/W Revision | Prior to A.02.00 |

In all views, the display is split into signal display windows and a numeric results (metrics) window. The metrics window displays carrier and modulation metrics and is similar to the numeric windows common in the SA communications measurements such as Channel Power and Occupied Bandwidth. The metrics associated with the 3 Demod measurements and their metrics including units are shown below.

For the Modulation Depth/FM Deviation/M Deviation metrics, two columns are displayed.

Column1: shows the metrics in real time, that is, the value from the last measurement, if Averaging is off. If averaging is on, it shows the average value of the metric since the last restart. This uses the arithmetic average:

$$\text{New avg} = ((K-1)\text{Old avg} + \text{New data})/K \text{ where } K \text{ is the average counter}$$

Column 2: shows the maximum value that the non-averaged metric has taken on since the last time the measurement was restarted, known as the “Max Hold” value (note: for the Peak– metric, Max Hold shall read the negative of the absolute value of the maximum value. For example, if the absolute value of Peak– got up to 80 kHz, the Max Hold column would read –80 kHz) Column 2 is only displayed if Aver/Hold is on.

| Metric  | Unit      |           |           |
|---|-----------|-----------|-----------|
|   | AM        | FM        | PM        |
| Carrier Power - the average power detected at the carrier frequency, averaged over integer periods of the modulation frequency  | (dBm)     | (dBm)     | (dBm)     |
| Carrier Frequency Error - represents the difference between the instrument’s tuned center frequency and the detected carrier’s frequency. This does not apply to AM signals.  | N/A       | (Hz)      | (Hz)      |
| Modulation Rate - represents the frequency of the detected modulation. This is also sometimes known as Modulation Frequency.  | (Hz)      | (Hz)      | (Hz)      |
| SINAD - represents the ratio of total received power (the received signal-plus-noise-plus-distortion power) to the received noise-plus-distortion power. It is always expressed in decibel units. The rejection of the carrier from the noise-plus-distortion power measurement is usually not much more than 50 dB, thus limiting the maximum SINAD. | (dB)      | (dB)      | (dB)      |
| Distortion/Total Voltage (rms) - represents the ratio of unwanted received power (noise plus distortion) to the total received power, expressed in % or dB on the display and over SCPI. Therefore, this metric is the negative of SINAD when expressed in decibels. The SCPI value is a true %; not a ratio.   | (dB or %) | (dB or %) | (dB or %) |

| Metric  | Unit      |           |           |
|---|-----------|-----------|-----------|
|   | AM        | FM        | PM        |
| THD - represents the ratio of the root mean square voltage of the harmonics referenced to the fundamental voltage, expressed in % or dB on the display and over SCPI. Note the difference with respect to Distortion. The denominator of the ratio is different and the items in the numerator do not include the noise between harmonics, just the harmonics themselves. The SCPI value is a true %; not a ratio.  | (dB or %) | (dB or %) | (dB or %) |
| Modulation Depth Peak (+) - the maximum modulation in units of % during the acquisition period.<br><br>When averaging is on, column 1 includes averaging of peaks through the acquisition period – this significantly improves the SNR when measuring cyclic signals. If averaging is off, column 1 shows simply the highest peak. Column 2 always shows the maximum of the highest peak.<br><br>Note that in amplitude modulation, the modulation depth (also known as % modulation or modulation index) is the amount of voltage deviation the modulated signal has relative to its original unmodulated level. Modulation depth of 100% means the peak voltage doubles, which in turn implies the peak power quadruples. | (%)       | N/A       | N/A       |
| Modulation Depth Peak (–) – represents the minimum value of modulation in units of % during the acquisition period. Not the absolute value, but the negative value.   | (%)       | N/A       | N/A       |
| Modulation Depth (Pk – Pk)/2 – half the difference between the modulation depth Peak+ and Peak-.  | (%)       | N/A       | N/A       |
| Modulation Depth RMS - represents the Root Mean Square modulation in units of % during the acquisition period.  | (%)       | N/A       | N/A       |
| Deviation Peak (+) - represents the maximum frequency (FM) or phase (PM) deviation during the acquisition period.<br><br>When averaging is on, column 1 includes averaging of peaks through the acquisition period – this significantly improves the SNR when measuring cyclic signals. If averaging is off, column 1 shows simply the highest peak. Column 2 always shows the maximum of the highest peak.   | N/A       | (Hz)      | (rad)     |
| Deviation Peak (–) - the minimum frequency (FM) or phase (PM) deviation during the acquisition period.  | N/A       | (Hz)      | (rad)     |
| Deviation (Pk-Pk)/2 - half the difference between the modulation depth Peak+ and Peak-.   | N/A       | (Hz)      | (rad)     |
| Deviation RMS - the Root Mean Square frequency (FM) or phase (PM) deviation during the acquisition period.  | N/A       | (Hz)      | (rad)     |

The key and command descriptions in this section describe functions of the Analog Demod Mode. In some instances, such as the Save front-panel key and the Display softkey, a more general description is documented. To access information on a specific key, press that key and then press the green Help key. This activates the applications context sensitive Help system, which displays the desired topic.







## AMPTD Y Scale

Preset:

AM:

RF Spectrum 0 dBm

Demod Waveform 0%

AF Spectrum 100%

FM:

RF Spectrum 0 dBm

Demod Waveform 0 Hz

AF Spectrum 100 kHz

PM:

RF Spectrum 0 dBm

Demod Waveform 0 rad

AF Spectrum 6.28 rad

State Saved:

Saved in State

Min:

AM:

RF Spectrum -170 dBm – Ext Gain

Demod Waveform -100%

AF Spectrum 1 m%

FM:

RF Spectrum -170 dBm – Ext Gain

Demod Waveform -10 GHz

AF Spectrum 1 Hz

PM:

RF Spectrum -170 dBm – Ext Gain

Demod Waveform -10 krad

AF Spectrum 100 urad

|                          |  |
|--------------------------|--|
| Max:                     | AM:<br>RF Spectrum 30 dBm<br>Demod Waveform 100%<br>AF Spectrum 10 k%      |
|                          | FM:<br>RF Spectrum 30 dBm<br>Demod Waveform 10 GHz<br>AF Spectrum 10 GHz   |
|                          | PM:<br>RF Spectrum 30 dBm<br>Demod Waveform 10 krad<br>AF Spectrum 10 krad |
| Key Path:                | <b>AMPTD Y Scale</b>   |
| Default Unit:            | depends on the current view.   |
| Instrument S/W Revision: | Prior to A.02.00   |

### Attenuation

In the Analog Demod Mode, only Mechanical Attenuation is available and it is always in Manual.

|                        |  |
|------------------------|--|
| <b>Remote Command:</b> | <code>[ :SENSe ] :POWer [ :RF ] :ATTenuation &lt;rel_amp1&gt;</code><br><code>[ :SENSe ] :POWer [ :RF ] :ATTenuation?</code> |
| Example:               | POW:ATT 20   |
| Preset:                | 10 dB  |
| 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 must be directly entered from the keypad or through SCPI. This prevents 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:                     | 70 dB            |
| Key Path:                | <b>AMPTD</b>     |
| Instrument S/W Revision: | Prior to A.02.00 |

## AMPTD Y Scale

### Scale / Div

Sets the units per vertical graticule division on the display.

The Scale/Div key applies only to the window with the focus. If the focus is on the Metrics window, the Scale/Div key is unavailable.

**Remote Command:**                   :DISPlay:AM|FM|PM:WINDow [1] |2|3:TRACe:Y[:SCALe]:PDIVisi  
on <real>

:DISPlay:AM|FM|PM:WINDow [1] |2|3:TRACe:Y[:SCALe]:PDIVisi  
on?

Remote Command Notes:           Regardless of the View, the windows are numbered as follows:

RF Spectrum

Demod Waveform

AF Spectrum

Metrics

Example:                           DISP:AM:WIND:TRAC:Y:PDIV 5 DB

Preset:

AM:

RF Spectrum    10 dB

Demod Waveform   20 %

AF Spectrum    10 dB

FM:

RF Spectrum    10 dB

Demod Waveform   15 kHz

AF Spectrum    10 dB

PM:

RF Spectrum    10 dB

Demod Waveform   1 rad

AF Spectrum    10 dB

State Saved:                    Saved in State

|                          |  |
|--------------------------|--|
| Min:                     | <p>AM:</p> <p>RF Spectrum 0.1 dB</p> <p>Demod Waveform 1%</p> <p>AF Spectrum 0.1 dB</p> <p>FM:</p> <p>RF Spectrum 0.1 dB</p> <p>Demod Waveform 1 Hz</p> <p>AF Spectrum 0.1 dB</p> <p>PM:</p> <p>RF Spectrum 0.1 dB</p> <p>Demod Waveform 10 mrad</p> <p>AF Spectrum 0.1 dB</p> |
| Max:                     | <p>AM:</p> <p>RF Spectrum 20 dB</p> <p>Demod Waveform 1 kHz</p> <p>AF Spectrum 20 dB</p> <p>FM:</p> <p>RF Spectrum 20 dB</p> <p>Demod Waveform 1 GHz</p> <p>AF Spectrum 20 dB</p> <p>PM:</p> <p>RF Spectrum 20 dB</p> <p>Demod Waveform 1 krad</p> <p>AF Spectrum 20 dB</p>    |
| Key Path:                | <b>AMPTD</b>   |
| Instrument S/W Revision: | Prior to A.02.00   |

## AMPTD Y Scale

### Ref Position

Positions the reference value at the top, center or bottom of the Y Scale display. Changing the reference position does not change the reference value.

The Ref Position key applies only to the window with the focus. If the focus is on the Metrics window, the Ref Position key is unavailable.

**Remote Command:**                   :DISPlay:AM|PM|FM:WINDow [1] | 2 | 3 :TRACe:Y[:SCALe] :RPOSiti  
on TOP|CENTer|BOTTom  
  
:DISPPlay:AM|PM|FM:WINDow [1] | 2 | 3 :TRACe:Y[:SCALe] :RPOSiti  
on?

**Remote Command Notes:**           Regardless of the View, the windows are numbered as follows:

RF Spectrum  
Demod Waveform  
AF Spectrum  
Metrics

**Example:**                           DISP:AM:WIND:TRAC:Y:RPOS BOTT

**Preset:**                             RF Spectrum window: Top  
Demod Waveform window: Center  
AF Spectrum window: Top

**State Saved:**                     Saved in State

**Key Path:**                         **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

**Remote Command** [:SENSe] :POWer [:RF] :GAIN:BAND LOW|FULL  
[:SENSe] :POWer [:RF] :GAIN:BAND?

Dependencies/Couplings Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown.

If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated.

Preset LOW

State Saved Saved in state

Key Path **AMPTD, Internal Preamp**

## Off

Turns the internal preamp off

Example :POW:GAIN OFF

Key Path **AMPTD, Internal Preamp**

## Low Band

Sets the internal preamp to use only the low band (0–3 GHz)

Example :POW:GAIN ON  
:POW:GAIN:BAND LOW

Key Path **AMPTD, Internal Preamp**

## AMPTD Y Scale

### Full Range

Sets the internal preamp to use its full range. The low band (0–3 GHz) is supplied by the low band preamp and the frequencies above 3.6 GHz are supplied by the high band preamp.

The instrument compensates for the preamp gain(s) as it sweeps. For the value of “Int Preamp Gain” in the Ref Level equations, we assume a preamp gain of 20 dB in Low Band Preamp mode and 35 dB in Full Range preamp mode. These gain rules are not dependent on start and stop frequencies. These gains are the maximum gain of the preamp hardware; we will always have the same or less actual gain, providing clipping margin.

The frequency range of the installed (optional) preamp is displayed in square brackets on the key label. If the high band option is not installed the Full Range key does not appear.

|          |                               |
|----------|-------------------------------|
| Example  | :POW:GAIN ON                  |
|          | :POW:GAIN:BAND FULL           |
| Key Path | <b>AMPTD, Internal Preamp</b> |



---

## 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.

For Analog Demod, these parameters are:

RF Res BW

AF Res BW

CF Step

|          |                        |
|----------|------------------------|
| Key Path | <b>Front-panel key</b> |
|----------|------------------------|

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

## Auto Couple

## BW

Opens a menu of keys that enable you to control the Bandwidth functions of the application.

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

### RF Res BW

Activates the RF **Res BW** function, which enables you to manually set the resolution bandwidth used in the RF Spectrum window.

Normally, **RF Res BW** (Auto) selects automatic coupling of the resolution bandwidth. To decouple the resolution bandwidth, press the RF Res BW key until Man is underlined, or enter a different value for the resolution bandwidth.

When the resolution bandwidth is manually selected, it may be returned to the coupled state by pressing the **RF Res BW** key until **Auto** is underlined. This may also be done by pressing Auto Couple or by performing a **Preset**.

Only the Gaussian filter type is used.

|                        |  |
|------------------------|--|
| <b>Remote Command:</b> | [ :SENSE ] :AM   FM   PM :BANDwidth [ :RESolution ] <freq><br>[ :SENSE ] :AM   FM   PM :BANDwidth [ :RESolution ] ?<br>[ :SENSE ] :AM   FM   PM :BANDwidth [ :RESolution ] :AUTO<br>OFF   ON   0   1<br>[ :SENSE ] :AM   FM   PM :BANDwidth [ :RESolution ] :AUTO? |
|------------------------|--|

|          |   |
|----------|---|
| Example: | AM:BAND 1 KHZ<br>AM:BAND?<br>AM:BAND:AUTO ON<br>AM:BAND:AUTO? |
|----------|---|

|                         |   |
|-------------------------|---|
| Dependencies/Couplings: | none<br><br>In Auto, the 3 dB RBW of the desired filter is the closest possible choice to that given by Span divided by 106 (the Span:3 dB RBW parameter), except that the range for auto-coupling is restricted to not exceed 3 MHz. |
|-------------------------|---|

|         |   |
|---------|---|
| Preset: | Preset is Auto, which results in a 680 Hz value since the preset span is 75 kHz and the Span/RBW ratio is 106 |
|---------|---|

|              |                           |
|--------------|---------------------------|
| State Saved: | Saved in Instrument State |
|--------------|---------------------------|

|      |      |
|------|------|
| Min: | 1 Hz |
|------|------|

|      |       |
|------|-------|
| Max: | 8 MHz |
|------|-------|

|           |           |
|-----------|-----------|
| Key Path: | <b>BW</b> |
|-----------|-----------|

## BW

Default Unit: Hz  
Instrument S/W Revision: Prior to A.02.00

### Channel BW

The Channel BW variable is used to determine the bandwidth used for the demodulation. The flat top filter type must be used for demodulation.

This parameter also controls the RBW hardware setting for the demodulation fed to the speaker.

**Remote Command:** [:SENSe]:AM|FM|PM:BANDwidth:CHANnel <freq>  
[:SENSe]:AM|FM|PM:BANDwidth:CHANnel?

Example: AM:BAND:CHAN 200 kHz

Preset: 25 kHz

State Saved: Saved in Instrument State

Min: 390 Hz

Max: 8 MHz

Key Path: **BW**

Default Unit: Hz

Instrument S/W Revision: Prior to A.02.00

### AF Res BW

In the AF Spectrum window, the AF Res BW key is used to set the Resolution bandwidth of the FFT of the demodulated waveform.

The data acquisition uses the Channel BW value for hardware control during data acquisition, just as it does in the Demod Waveform window.

AF Res BW (Auto) selects automatic coupling of the AF Res BW to the AF Span (defined as AF Stop Freq – AF Start Freq) using the same factor of 106 used by the RF Res BW. To decouple the resolution bandwidth, press the AF Res BW key until **Man** is underlined, or enter a different value for the AF resolution bandwidth.

When the AF resolution bandwidth is manually selected, it may be returned to the coupled state by pressing the **AF Res BW** key until **Auto** is underlined. This may also be done by pressing Auto Couple or by performing a **Preset**.

Only the Gaussian filter type is used.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | <pre>[ :SENSE] :AM FM PM:AFSPectrum:BA NDwidth &lt;freq&gt; [ :SENSE] :AM FM PM:AFSPectrum:BA NDwidth? [ :SENSE] :AM FM PM:AFSPectrum:BA NDwidth:AUTO OFF ON 0 1 [ :SENSE] :AM FM PM:AFSPectrum:BA NDwidth:AUTO?</pre>                       |
| Example:                 | <pre>AM:AFSP:BA ND 1 KHZ AM:AFSP:BA ND?</pre>  |
| Dependencies/Couplings:  | <p>none</p> <p>In Auto, the 3 dB RBW of the desired filter is the closest possible choice to that given by Span divided by 106 (the Span:3 dB RBW parameter), except that the range for auto-coupling is restricted to not exceed 3 MHz.</p> |
| Remote Command Notes:    | The setting and querying of values depends on the current bandwidth type.  |
| Preset:                  | Preset is Auto, which results in a 180 Hz value since the preset span is 20 kHz and the Span/RBW ratio is 106  |
| State Saved:             | Saved in Instrument State  |
| Min:                     | 1 Hz   |
| Max:                     | 8 MHz  |
| Key Path:                | <b>BW</b>  |
| Default Unit:            | Hz   |
| Instrument S/W Revision: | Prior to A.02.00   |

**BW**

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## 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.

|                          |   |
|--------------------------|---|
| <b>Remote Command:</b>   | :INITiate:CONTinuous OFF ON 0 1<br>:INITiate:CONTinuous?  |
| Example:                 | :INIT:CONT 0 puts analyzer in Single measurement operation.<br>:INIT:CONT 1 puts analyzer in Continuous measurement operation |
| Preset:                  | ON<br><br>(Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF)   |
| State Saved:             | Saved in Instrument State   |
| Key Path:                | <b>Front-panel key</b>  |
| 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 is already in continuous sweep:

the INIT:CONT 1 command has no effect

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until k = N, at which point the current sequence will stop and the instrument will go to the idle state.

**Cont (Continuous Measurement/Sweep)**



---

## FREQ Channel

The Frequency front-panel key accesses a menu of keys that enable you to control the Frequency parameters of the instrument.

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

### Center Frequency

Sets the frequency that corresponds to the horizontal center of the RF Spectrum window. While adjusting the Center Frequency the Span is held constant, this means that both the start frequency and the stop frequency will change.

The Center Frequency is retained as you go from measurement to measurement.

**Remote Command:**            [:SENSe] :FREQuency:CENTer <freq>  
    [:SENSe] :FREQuency:CENTer?

Example:                            FREQ:CENT 50MHz  
    FREQ:CENT UP  
    changes the center frequency to 150 MHz if you use  
    FREQ:CENT:STEP 100MHz  
    sets the center frequency step size to 100 MHz  
    FREQ:CENT?

Dependencies/Couplings:        The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop hit their limit.  
    When operating in “swept span”, any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer’s frequency range

Preset:                                1.000 GHz

State Saved:                        Saved in State

Min:                                    Depends on instrument minimum frequency and 10 Hz minimum span. If the knob or step keys are being used, depends on the value of the other three interdependent parameters.

Max:                                    Depends on instrument maximum frequency and 10 Hz minimum span  
    If the knob or step keys are being used, depends on the value of the other three interdependent parameters.

Key Path:                            **FREQ Channel**

## FREQ Channel

|                                    |                  |
|------------------------------------|------------------|
| Default Unit:                      | Hz               |
| SCPI Status Bits/OPC Dependencies: | non-overlapped   |
| Instrument S/W Revision:           | Prior to A.02.00 |

### CF Step

Changes the step size for the center frequency function. Once a step size has been selected and the center frequency function is active, the step keys (and the UP|DOWN parameters for Center Frequency from remote commands) change center frequency by the step-size value. The step size function is useful for finding harmonics and sidebands beyond the current frequency span of the analyzer.

**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:AUTO ON  
FREQ:CENT:STEP 500MHz  
FREQ:CENT UP  
increases the current center frequency value by 500 MHz  
FREQ:CENT:STEP?  
FREQ:CENT:STEP:AUTO?

**Dependencies/Couplings:** Span, RBW, Center frequency  
When auto-coupled in a non-zero span, the center frequency step size is set to 10% of the span. When auto-coupled in zero span, the center frequency step size is set to the equivalent -3 dB RBW value.

**Remote Command Notes:** Preset and Max values are depending on Hardware Options (503, 508, 513, 526)

**Preset:** Auto

**State Saved:** Saved in State

**Min:** - (the maximum frequency of the instrument). For example, 27 GHz max freq instrument has a CF step range of +/- 27 GHz.

**Max:** The maximum frequency of the instrument. For example, 27 GHz max freq instrument has a CF step range of +/- 27 GHz.

**Key Path:** **FREQ Channel**

|                                    |                |
|------------------------------------|----------------|
| Default Unit:                      | Hz             |
| SCPI Status Bits/OPC Dependencies: | non-overlapped |

Instrument S/W Revision: Prior to A.02.00

## AF Start Freq

Sets the frequency at the left side of the graticule in the AF Spectrum window. While adjusting the AF start frequency the AF stop frequency is held constant.

The AF Start Frequency is retained as you go from measurement to measurement.

|                                    |  |
|------------------------------------|--|
| <b>Remote Command:</b>             | [ :SENSe] :AM FM PM:AFSPectrum:FREQUency:STARt <freq><br>[ :SENSe] :AM FM PM:AFSPectrum:FREQUency:STARt?   |
| Example:                           | AM:AFSP:FREQ:STAR 0 Hz   |
| Dependencies/Couplings:            | You cannot set the Start frequency > the Stop frequency. You cannot set the Start frequency = Stop frequency. You cannot set the Start Frequency to a value that would create a span of less than 10 Hz. If you try to do any of these, Stop Frequency will change to maintain a minimum value of 10 Hz for the difference between Start and Stop. |
| Preset:                            | 0 Hz   |
| State Saved:                       | Saved in State   |
| Min:                               | 0 Hz   |
| Max:                               | 99.999990 MHz  |
| Key Path:                          | <b>FREQ Channel</b>  |
| Default Unit:                      | Hz   |
| SCPI Status Bits/OPC Dependencies: | non-overlapped   |
| Instrument S/W Revision:           | Prior to A.02.00   |

## AF Stop Freq

Sets the frequency at the right side of the graticule in the AF Spectrum window. While adjusting the AF Stop Frequency the AF Start Frequency is held constant.

|                         |  |
|-------------------------|--|
| <b>Remote Command:</b>  | [ :SENSe] :AM FM PM:AFSPectrum:FREQUency:STOP <freq><br>[ :SENSe] :AM FM PM:AFSPectrum:FREQUency:STOP?   |
| Example:                | AM:AFSP:FREQ:STOP 20 kHz   |
| Dependencies/Couplings: | You cannot set the Stop frequency < the Start frequency. You cannot set the Start frequency = Stop frequency. You cannot set Stop Frequency to a value that would create a span of less than 10 Hz. If you try to do any of these, the Start Frequency will change to maintain a minimum value of 10 Hz for the difference between Start and Stop. |
| Preset:                 | 20 kHz   |

## FREQ Channel

|                                    |                     |
|------------------------------------|---------------------|
| State Saved:                       | Saved in State      |
| Min:                               | 10 Hz               |
| Max:                               | 100 MHz             |
| Key Path:                          | <b>FREQ Channel</b> |
| Default Unit:                      | Hz                  |
| SCPI Status Bits/OPC Dependencies: | non-overlapped      |
| Instrument S/W Revision:           | Prior to A.02.00    |

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## 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:

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | [ :SENSe] :FEED RF   AIQ   IQ   IONLy   QONLy   AREFERENCE<br>[ :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.<br><br>It is set to RF on a "Restore Input/Output Defaults" or "Restore System Defaults->All" |
| State Saved:             | Saved in state   |
| Key Path:                | <b>Front-panel key</b>   |
| 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:                 | <code>[::SENSE]:FEED RF</code>  |
| Key Path:                | <b>Input/Output</b>   |
| Readback:                | The current input impedance settings are Readback to this key, for example:<br>"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 $\mu$ V, dB $\mu$ 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.

|                          |   |
|--------------------------|---|
| <b>Remote Command:</b>   | <code>[::SENSE]:CORREction:IMPedance[:INPut][:MAGNitude] 50 75</code><br><code>[::SENSE]:CORREction:IMPedance[:INPut][:MAGNitude]?</code>   |
| Example:                 | <code>CORR:IMP 75</code> sets the input impedance correction to 75 ohms.<br><code>CORR:IMP?</code>  |
| Preset:                  | This is unaffected by Preset but is set to 50 ohms on a "Restore Input/Output Defaults" or "Restore System Defaults->All"<br><br>Some instruments/options may have 75 ohms available. |
| State Saved:             | Saved in State  |
| Key Path:                | <b>Input/Output, RF Input</b>   |
| 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

## Input/Output

### 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.  |
| Remote Command Notes    | <p>The parameters IQ IONLy QONLy are only supported for backwards compatibility. The E44406 SCPI has the following that corresponds to FEED:IQ:TYPE for MXA.</p> <pre>[[:SENSe]:FEED IQ IONLy QONLy<br/>[:SENSe]:FEED?</pre> <p>[[:SENSe]:FEED IQ will set the I/Q path to IQ<br/>[:SENSe]:FEED IONLy will set the I/Q path to I Only<br/>[:SENSe]:FEED QONLy will set the I/Q path to QOnly</p> <p>Note [:SENSe]:FEED? will not be backward compatible.<br/>The query [:SENSe]:FEED? will always return AIQ whatever the type of legacy parameters IQ IONLy QONLy has been used.</p> |
| Example                 | FEED AIQ  |
| Key Path                | <b>Input/Output</b>   |
| 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 $\Omega$  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  $\Omega$  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 $\Omega$  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.

## Input/Output

The input is a context and some parameters have separate values for each context. The SCPI for these parameters has an optional "[:RF]IQ" node. If the specific context is omitted, the command acts on the current input context's value. Here are the parameters that are input context sensitive:

- Center Frequency
- Trigger Source

It is important to distinguish between the I and Q input ports and the displayed I and Q data values. The I and Q input ports feed into a digital receiver that does digital tuning and filtering. The I and Q data seen by you (either on the display or through SCPI) corresponds to the real ("I") and the imaginary ("Q") output from the digital receiver. When the input path is I+jQ or I Only and the center frequency is 0 Hz the I input ends up in as the real output from the receiver and appears as "I" data. Likewise, when the input path is I+jQ and the center frequency is 0 Hz, the Q input ends up as the imaginary output from the receiver and appears as "Q" data. However, when the input path is Q Only, the Q input is sent to the receiver as Q+j0, so the receiver output has the Q input coming out on the real output, and so in Q Only, the signal from the Q input port appears as the "I" data. Another situation where the I and Q data do not necessarily correspond directly to the I and Q inputs is when the center frequency is non-zero. The digital processing involved in the tuning is a complex operation. This will result in I Only data appearing as both "I" and "Q" data, the same as that signal would appear if seen through the RF input port.

### I/Q Path

Select which I/Q input channels are active. The LED next to each I/Q input port will be on when that port is active.

The analysis bandwidth for each channel is the same as that of the instrument. So, for example, the base 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**                    [:SENSE] :FEED:IQ:TYPE IQ|IONLY|QONLY  
   [:SENSE] :FEED:IQ:TYPE?

**Example**                                Set the input to be both the I and Q channels, combined as  $I + j * Q$ .  
   FEED:IQ:TYPE IQ

|                          |   |
|--------------------------|---|
| Key Path                 | <b>Input/Output, I/Q</b>  |
| 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  |
| <b>Remote Command:</b>   | : INPut [1] : IQ:TYPE IQ   I   Q<br>: INPut [1] : IQ:TYPE?  |
| Preset:                  | IQ  |
| Instrument S/W Revision: | Prior to A.02.00  |

### I+jQ

Sets 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 $I + j * Q$ .<br>FEED:IQ:TYPE IQ |
|---------|---|

|                         |                                    |
|-------------------------|------------------------------------|
| Key Path                | <b>Input/Output, I/Q, I/Q Path</b> |
| Instrument S/W Revision | Prior to A.02.00                   |

### I Only

Sets 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.<br>FEED:IQ:TYPE IONL |
|---------|--|

|                         |                                    |
|-------------------------|------------------------------------|
| Key Path                | <b>Input/Output, I/Q, I/Q Path</b> |
| Instrument S/W Revision | Prior to A.02.00                   |

## Input/Output

### Q Only

Sets 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

Accesses 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

Selects differential input on or off for the I channel. For differential input (also called balanced input), the analyzer uses both main and complementary ports. When differential input is off (also called single-ended or unbalanced input), the analyzer uses only the main port.

**Remote Command** :INPut:IQ[:I]:DIFFerential OFF|ON|0|1

```
:INPut:IQ[:I]:DIFFerential?
```

Dependencies/Couplings Some active probes include built-in differential capability. When one of these probes is sensed, this key is disabled. Since the differential capability is handled in the probe, the Analyzer will use only the main port and the key will show that the Analyzer's Differential Input mode is Off (indicating that the complementary port not in use).

When Q Same as I is On, the value set for I will also be copied to Q.

Restriction and Notes When Differential Input = On, the analyzer will check for attenuation mismatches between the I and I-bar ports. If the difference in attenuation values exceeds 0.5 dB an error condition will be set.

Example Put the I channel in Differential Input mode

```
INP:IQ:DIFF ON
```

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  |
| <b>Remote Command:</b>   | : INPut [1] : IQ:BAALanced [: STATE] OFF   ON   0   1<br>: INPut [1] : IQ:BAALanced [: STATE] ?   |
| Preset:                  | OFF   |
| Remote Command Notes:    | This backwards compatibility SCPI command was for an instrument without independent settings for the I and Q channels. Therefore, it is tied only to the I channel and does not provide an equivalent for the Q channel. For proper operation of the backwards compatibility command Q Same as I should be set to On. |
| Instrument S/W Revision: | Prior to A.02.00  |

## I Input Z

Selects 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.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | : INPut [1] : IQ[: I] : IMPedance LOW   HIGH<br>: 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.<br>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 $\Omega$ , HIGH = 1 M $\Omega$  |
| Example                 | Set the I channel input impedance to 1 M $\Omega$<br>INP:IQ:IMP HIGH   |
| Key Path                | <b>Input/Output, I/Q, I Setup</b>  |
| 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 $\Omega$   1 M $\Omega$   |
| Instrument S/W Revision | Prior to A.02.00   |

## Input/Output

### I Skew

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.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | <code>[ :SENSE ] :CORRection:IQ[:I]:SKEW &lt;seconds&gt;</code><br><code>[ :SENSE ] :CORRection:IQ[:I]:SKEW?</code>                            |
| Example                 | Delay the data for the I channel by 10 ns.<br><code>CORR:IQ:SKEW 10 ns</code>  |
| Key Path                | <b>Input/Output, I/Q, I Setup</b>  |
| Preset                  | 0  |
| State Saved             | Yes<br><br>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

Accesses the probe setup parameters for the I channel. See [“I/Q Probe Setup” on page 290](#).

|                         |  |
|-------------------------|--|
| Key Path                | <b>Input/Output, I/Q, I Setup</b>  |
| State Saved             | No   |
| Readback Text           | [<I port probe id><br><br>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.

|                        |   |
|------------------------|---|
| <b>Remote Command:</b> | <code>:INPut : IMPedance : IQ U50   B50   U1M   B1M</code><br><code>:INPut : IMPedance : IQ?</code> |
| Preset:                | U50   |

|                          |  |
|--------------------------|--|
| Remote Command Notes:    | <p>The enum values translate as follows:</p> <p>U50: Differential Input = Off, Input Z = 50Ω</p> <p>B50: Differential Input = On, Input Z = 50Ω</p> <p>U1M: Differential Input = Off, Input Z = 1 MΩ</p> <p>B1M: Differential Input = On, Input Z = 1 MΩ</p> <p>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.</p> <p>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.</p> <p>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.</p> |
| 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:                 | <pre>:INPut:IMPedance:IQ U50</pre> <p>This is equivalent to the following two SCPI commands:</p> <pre>:INP:IQ:DIFf OFF :INP:IQ:IMP 50</pre>  |
| Instrument S/W Revision: | Prior to A.02.00   |

## Q Setup

Access the channel setup parameters for the Q channel.

|                         |   |
|-------------------------|---|
| Key Path                | <b>Input/Output, I/Q</b>                              |
| 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                                      |

## Input/Output

### 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.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | : INPut : IQ:MIRRored OFF ON 0 1<br>: 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:<br><br>Differential Input (when not determined by probe)<br>Input Z (when not determined by probe) |
| Example                 | Turn off the mirroring of parameters from I to Q.<br>INP:IQ:MIRR OFF  |
| Key Path                | <b>Input/Output, I/Q, Q Setup</b>   |
| 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

Selects 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.

|                        |  |
|------------------------|--|
| <b>Remote Command</b>  | : INPut : IQ:Q:DIFFerential OFF ON 0 1<br>: INPut : IQ:Q:DIFFerential?   |
| 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).<br><br>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. |



|                         |  |
|-------------------------|--|
| 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                 | Put the Q channel in Differential Input mode<br>INP:IQ:Q:DIFF ON   |
| Key Path                | <b>Input/Output, I/Q, Q Setup</b>  |
| Preset                  | Off  |
| State Saved             | On<br><br>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

Selects 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.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | : INPut [1] : IQ:Q: IMPedance LOW HIGH<br>: INPut [1] : IQ:Q: 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.<br><br>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. |
| Remote Command Notes    | LOW = 50 $\Omega$ , HIGH = 1 M $\Omega$  |
| Example                 | Set the Q channel input impedance to 1 M $\Omega$<br>INP:IQ:Q:IMP HIGH   |
| Key Path                | <b>Input/Output, I/Q, Q Setup</b>  |
| Preset                  | LOW  |
| State Saved             | On<br><br>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 $\Omega$   1 M $\Omega$   |
| Instrument S/W Revision | Prior to A.02.00   |

## Input/Output

### Q Skew

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.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | <code>[[:SENSE]:CORREction:IQ:Q:SKEW &lt;seconds&gt;</code><br><code>[[:SENSE]:CORREction:IQ:Q:SKEW?</code>                                    |
| Example                 | Delay the data for the Q channel by 10 ns.<br><code>CORR:IQ:Q:SKEW 10 ns</code>  |
| Key Path                | <b>Input/Output, I/Q, Q Setup</b>  |
| Preset                  | 0  |
| State Saved             | Yes<br><br>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

Accesses the probe setup parameters for the Q channel. See [“I/Q Probe Setup” on page 290](#).

|                         |  |
|-------------------------|--|
| Key Path                | <b>Input/Output, I/Q, Q Setup</b>  |
| State Saved             | No   |
| Readback Text           | [<Q port probe id><br><br>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".

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 323](#)).

## 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.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | <code>[ :SENSe ] :CORRection:IQ:I   Q:ATTenuation:RATio &lt;real&gt;</code><br><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.<br><code>CORR:IQ:I:ATT:RAT 100</code>   |
| Key Path                | <b>Input/Output, I/Q, I Setup   Q Setup, I Probe   Q Probe</b>   |
| 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.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | <code>[ :SENSe ] :CORRection:IQ:I   Q:ATTenuation &lt;rel_amp1&gt;</code><br><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.<br><code>CORR:IQ:I:ATT 20 dB</code>                                      |
| Instrument S/W Revision: | Prior to A.02.00   |

## Input/Output

### 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.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | <code>:INPut:OFFSet:I Q &lt;voltage&gt;</code><br><code>:INPut:OFFSet:I Q?</code>  |
| 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.<br><code>INP:OFFS:I-0.5</code>  |
| Key Path                | <b>Input/Output, I/Q, I Setup   Q Setup, I Probe   Q Probe</b>   |
| 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.

|                       |  |
|-----------------------|--|
| <b>Remote Command</b> | <code>:INPut:COUPling:I Q DC LFR1 LFR2</code><br><code>:INPut:COUPling:I Q?</code>   |
| 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.<br><code>INP:COUP:I LFR1</code>   |
| Key Path              | <b>Input/Output, I/Q, I Setup   Q Setup, I Probe   Q Probe</b>   |
| Preset                | DC   |
| State Saved           | Saved with probe calibration data. It survives power cycle and is not affected by Preset or Restore.   |

|                         |                                       |
|-------------------------|---------------------------------------|
| Range                   | DC   AC 1.7 Hz LFR1   AC 0.14 Hz LFR2 |
| Readback Text           | DC   LFR1   LFR2                      |
| Instrument S/W Revision | Prior to A.02.00                      |

**DC**

Turns off low frequency rejection, allowing signals down to DC.

|                         |  |
|-------------------------|--|
| Example                 | Turn off low frequency rejection on the I channel<br>INP:COUP:I DC       |
| Key Path                | <b>Input/Output, I/Q, I Setup   Q Setup, I Probe   Q Probe, Coupling</b> |
| Instrument S/W Revision | Prior to A.02.00   |

**LFR1**

Turns 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<br>INP:COUP:I LFR1 |
| Key Path                | <b>Input/Output, I/Q, I Setup   Q Setup, I Probe   Q Probe, Coupling</b>                              |
| Instrument S/W Revision | Prior to A.02.00  |

**LFR2**

Turns 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<br>INP:COUP:I LFR2 |
| Key Path                | <b>Input/Output, I/Q, I Setup   Q Setup, I Probe   Q Probe, Coupling</b>                               |
| Instrument S/W Revision | Prior to A.02.00   |

## Input/Output

### 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 323.

|                         |   |
|-------------------------|---|
| Key Path                | <b>Input/Output, I/Q, I Setup   Q Setup, I Probe   Q Probe, Coupling</b>  |
| Readback Text           | The last calibration date, or if no calibration exists, "(empty)".<br>Last: <cal date><br><cal time><br>Example:<br>Last: 8/22/2007<br>1:02:49 PM |
| Instrument S/W Revision | Prior to A.02.00  |

### Clear Calibration

Clears 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.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :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).<br>:CAL:IQ:PROBe:I:CLE |
| Key Path                | <b>Input/Output, I/Q, I Setup   Q Setup, I Probe   Q Probe</b>  |
| Instrument S/W Revision | Prior to A.02.00  |

### Reference Z

Sets 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 285).

|                       |   |
|-----------------------|---|
| <b>Remote Command</b> | :INPut:IMPedance:REFerence <integer><br>:INPut:IMPedance:REFerence? |
|-----------------------|---|

|                         |  |
|-------------------------|--|
| Example                 | Set the I/Q reference impedance to 50 $\Omega$<br>INP:IMP:REF 50   |
| Key Path                | <b>Input/Output, I/Q</b>   |
| Preset                  | 50 $\Omega$  |
| State Saved             | Yes<br><br>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 $\Omega$ to 1 M $\Omega$   |
| 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).

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | [ :SENSE] :FEED:AREFERENCE REF50   REF4800   COMB   OFF<br>[ :SENSE] :FEED:AREFERENCE?   |
| Example:                 | FEED:AREF REF50 selects the 50 MHz amplitude reference as the signal input.<br><br>FEED:AREF REF4800 selects the 4.8 GHz amplitude reference as the signal input<br><br>FEED:AREF COMB selects the 300 MHz comb modulated signal as the signal input<br><br>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.<br><br>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:                | <b>Input/Output</b>  |
| Readback:                | Off, 50 MHz, 4.8 GHz or Comb   |
| Instrument S/W Revision: | Prior to A.02.00   |

## Input/Output

### 50 MHz

Sends the 50 MHz internal reference as the input signal.

|                         |                                    |
|-------------------------|------------------------------------|
| Key Path                | <b>Input/Output, RF Calibrator</b> |
| 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:                | <b>Input/Output, RF Calibrator</b>   |
| Readback:                | 4.8 GHz  |
| Instrument S/W Revision: | Prior to A.02.00   |

### Comb

Selects the 300 MHz comb modulated signal as the input signal.

|                         |                                    |
|-------------------------|------------------------------------|
| Key Path                | <b>Input/Output, RF Calibrator</b> |
| 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                | <b>Input/Output, RF Calibrator</b> |
| 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.

---

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\_ampl>  
 [:SENSE]:CORRection:SA[:RF]:GAIN?

Example: CORR:SA:GAIN 10 sets the Ext Gain value to 10 dB  
 CORR:SA:GAIN -10 sets the Ext Gain value to -10 dB (that is, an attenuation of 10 dB)

## Input/Output

|                          |   |
|--------------------------|---|
| Dependencies/Couplings:  | The reference level limits are determined in part by the External Gain/Atten, Max Mixer Level, and RF Atten.<br><br>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:                | <b>Input/Output, External Gain</b>  |
| 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.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | <code>[ :SENSE ] :CORRection:MS [ :RF ] :GAIN &lt;rel_ampl&gt;</code><br><code>[ :SENSe ] :CORRection:MS [ :RF ] :GAIN?</code>                               |
| Example:                 | <code>CORR:MS:GAIN 10</code> sets the Ext Gain value to 10 dB<br><code>CORR:MS:GAIN -10</code> sets the Ext Gain value to -10 dB (that is, a loss of 10 dB.) |
| Dependencies/Couplings:  | The reference level limits are determined in part by the External Gain, Max Mixer Level, RF Atten<br><br>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:                | <b>Input/Output, External Gain</b>   |
| 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.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | <code>[ :SENSE ] :CORRection:BTS [ :RF ] :GAIN &lt;rel_ampl&gt;</code><br><code>[ :SENSE ] :CORRection:BTS [ :RF ] :GAIN?</code>                               |
| Example:                 | <code>CORR:BTS:GAIN 10</code> sets the Ext Gain value to 10 dB<br><code>CORR:BTS:GAIN -10</code> sets the Ext Gain value to -10 dB (that is, a loss of 10 dB.) |
| Dependencies/Couplings:  | The reference level limits are determined in part by the External Gain, Max Mixer Level, RF Atten<br><br>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:                | <b>Input/Output, External Gain</b>   |
| 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.

|                       |  |
|-----------------------|--|
| <b>Remote Command</b> | <code>[ :SENSE ] :CORRection:IQ:I:GAIN &lt;rel_ampl&gt;</code><br><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<br><code>CORR:IQ:I:GAIN 10</code><br><br>Set the I Ext Gain to -10 dB (that is, a loss of 10 dB.)<br><code>CORR:IQ:I:GAIN -10</code> |
| Key Path              | <b>Input/Output, External Gain</b>   |
| Preset                | 0 dB<br><br>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.   |

## Input/Output

|                         |                         |
|-------------------------|-------------------------|
| 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.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | <code>[[:SENSE]:CORREction:IQ:Q:GAIN &lt;rel_ampl&gt;</code><br><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<br><code>CORR:IQ:Q:GAIN 10</code><br>Set the Q Ext Gain to -10 dB (that is, a loss of 10 dB.)<br><code>CORR:IQ:Q:GAIN -10</code> |
| Key Path                | <b>Input/Output, External Gain</b>   |
| Preset                  | 0 dB<br><br>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 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: INPut = 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

## Input/Output

### 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.

|                          |   |
|--------------------------|---|
| <b>Remote Command:</b>   | [ :SENSe ] :FEED:DATA:STORe             |
| Example:                 | FEED:DATA:STOR stores recorded data     |
| Dependencies/Couplings:  | Grayed out in the SA measurement.       |
| Remote Command Notes:    | This is command only, there is no query |
| Key Path:                | <b>Input/Output, Data Source</b>        |
| 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.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | [ :SENSe ] :RECOrding:INITiate[:IMMediate]   |
| Example                 | REC:INIT   |
| Dependencies/Couplings  | Changes Data source to Recorded Data.<br>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                | <b>Input/Output, Data Source</b>   |
| Mode                    | VSA  |
| Instrument S/W Revision | Prior to A.02.00   |
| <b>Remote Command:</b>  | [ :SENSe ] :RECOrding:ABORt  |
| Example:                | REC:ABOR   |
| Key Path:               | <b>Input/Output, Data Source</b>   |

## Input/Output

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

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  |
| <b>Remote Command</b>   | [ :SENSe ] :RECOrding:LENGth:UNIT?  |
| Example                 | REC:LENG:UNIT?  |
| Remote Command Notes    | Query Only<br>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                  | RECOrcs   |
| 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    | <b>Input/Output, Corrections</b> |
| Mode        | SA, DVB-T/H, DTMB                |
| Measurement | Swept SA                         |

## Input/Output

|                         |   |
|-------------------------|---|
| 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                | <b>Input/Output, Corrections</b>                     |
| 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 <b>Restore Input/Output Defaults</b> |
| State Saved:             | Saved in State   |
| Key Path:                | <b>Input/Output, Corrections</b>   |
| Instrument S/W Revision: | A.02.00  |

### Properties

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

|                         |                                  |
|-------------------------|----------------------------------|
| Key Path                | <b>Input/Output, Corrections</b> |
| 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                | <b>Input/Output, Corrections, Properties</b>         |
| 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 $\mu$ 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.

|                       |   |
|-----------------------|---|
| <b>Remote Command</b> | [ :SENSE ] :CORRection:CSET [ 1 ]   2   3   4 :ANTenna [ :UNIT ]<br>GAUSS   PTES1a   UVM   UAM   NOConversion |
|                       | [ :SENSe ] :CORRection:CSET [ 1 ]   2   3   4 :ANTenna [ :UNIT ] ?  |
| Example               | CORR:CSET:ANT GAUS  |

## Input/Output

|                         |   |
|-------------------------|---|
| Dependencies/Couplings  | Only the first correction array (Correction 1) supports antenna units.<br><br>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                | <b>Input/Output, Corrections, Properties</b>  |
| 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 $\mu$ V/m**

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

|                          |  |
|--------------------------|--|
| Example:                 | :CORR:CSET2:ANT UVM  |
| Key Path:                | <b>Input/Output, Corrections, Properties, Antenna Unit</b> |
| Readback:                | "dB $\mu$ V/m"   |
| Instrument S/W Revision: | A.02.00  |

### **dB $\mu$ A/m**

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

|                          |  |
|--------------------------|--|
| Example:                 | :CORR:CSET2:ANT UVA  |
| Key Path:                | <b>Input/Output, Corrections, Properties, Antenna Unit</b> |
| Readback:                | " dB $\mu$ 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: | <b>Input/Output, Corrections, Properties, Antenna Unit</b> |
| 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

### 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

## Input/Output

### 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.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | <code>[ :SENSE ] :CORREction:CSET [1]   2   3   4 :DESCription "text"</code><br><code>[ :SENSE ] :CORREction:CSET [1]   2   3   4 :DESCription?</code> |
| Example:                 | <code>:CORR:CSET1:DESC "11941A Antenna correction"</code>  |
| Remote Command Notes:    | 45 chars max; may not fit on display if max chars used   |
| Preset:                  | Unaffected by Preset. Set to empty by <b>Restore Input/Output Defaults</b>   |
| State Saved:             | Saved in State   |
| Key Path:                | <b>Input/Output, Corrections, Properties</b>   |
| 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.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | <code>[ :SENSE ] :CORREction:CSET [1]   2   3   4 :COMMEnt "text"</code><br><code>[ :SENSE ] :CORREction:CSET [1]   2   3   4 :COMMEnt?</code> |
| Example:                 | <code>:CORR:CSET1:COMM "this is a comment"</code>  |
| Remote Command Notes:    | 45 chars max; may not fit on display if max chars used   |
| Preset:                  | Unaffected by Preset. Set to empty by <b>Restore Input/Output Defaults</b>   |
| State Saved:             | Saved in State   |
| Key Path:                | <b>Input/Output, Corrections, Properties</b>   |
| 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 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                | <b>Input/Output, Corrections</b> |
| Instrument S/W Revision | A.02.00                          |

### Navigate

Lets you move through the table to edit the desired point

|                         |  |
|-------------------------|--|
| Key Path                | <b>Input/Output, Corrections, Edit</b> |
| 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                | <b>Input/Output, Corrections, Edit</b> |
| Notes                   | There is no value readback on the key  |
| Instrument S/W Revision | A.02.00                                |

## Input/Output

### Amplitude

Lets you edit the Amplitude of the current row.

|                         |  |
|-------------------------|--|
| Key Path                | <b>Input/Output, Corrections, Edit</b> |
| 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                | <b>Input/Output, Corrections, Edit</b> |
| 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                | <b>Input/Output, Corrections, Edit</b> |
| 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                | <b>Input/Output, Corrections, Edit</b> |
| 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.

|                        |  |
|------------------------|--|
| <b>Remote Command:</b> | <code>[ :SENSE ] :CORRection:CSET [1]   2   3   4 :DELete</code> |
|------------------------|--|



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 306) 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

### 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.

|                          |   |
|--------------------------|---|
| <b>Remote Command:</b>   | <code>[[:SENSe]:CORRection:CSET[1] 2 3 4:DATA &lt;freq&gt;, &lt;ampl&gt;, .<br/>.<br/>.<br/>[:SENSe]:CORRection:CSET[1] 2 3 4:DATA?</code>                    |
| Example:                 | <code>CORR:CSET1:DATA 10000000,-1.0,20000000,1.0</code><br>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<br>Amptd: -1000 dBm  |
| Max:                     | Freq: 1 THz<br>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.

|                        |  |
|------------------------|--|
| <b>Remote Command:</b> | <code>[[:SENSe]:CORRection:CSET[1] 2 3 4:DATA:MERGE &lt;freq&gt;,<br/>&lt;ampl&gt;, . . .</code>   |
| Example:               | <code>CORR:CSET1:DATA:MERGE 15000000,-5.0,25000000,5.0</code><br>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<br>Amptd: -1000 dBm  |
| Max:                     | Freq: 1 THz<br>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.

|                                    |  |
|------------------------------------|--|
| <b>Remote Command:</b>             | [ :SENSE ] :ROSCillator:SOURce:TYPE<br>INTernal   EXTernal   SENSE<br><br>[ :SENSE ] :ROSCillator:SOURce:TYPE?           |
| 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:                          | <b>Input/Output</b>  |
| SCPI Status Bits/OPC Dependencies: | STATus:QUEStionable:FREQUency bit 2 set if unlocked.   |
| Instrument S/W Revision:           | Prior to A.02.00   |
| <b>Remote Command:</b>             | [ :SENSE ] :ROSCillator:SOURce?  |

## Input/Output

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.

|                          |   |
|--------------------------|---|
| <b>Remote Command:</b>   | <code>[ :SENSe ] :ROSCillator:EXTernal:FREQuency &lt;freq&gt;</code><br><code>[ :SENSe ] :ROSCillator:EXTernal:FREQuency?</code>  |
| Example:                 | ROSC:EXT:FREQ 20 MHz sets the external reference frequency to 20 MHz, but does not select the external reference.<br>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<br>MXA: 1 MHz   |
| Max:                     | EXA: 10 MHz<br>MXA: 50 MHz  |
| Key Path:                | <b>Input/Output, Freq Ref In</b>  |
| 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.

## Input/Output

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
```

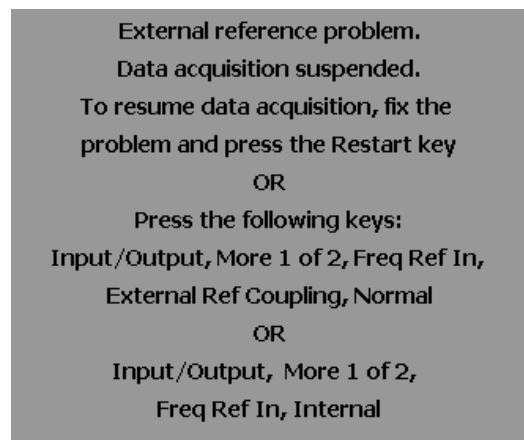
```
:READ?
```

```
--
```

```
: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.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | <code>[ :SENSE ] :ROSCillator:COUPling NORMAl   NACQuisition</code><br><code>[ :SENSE ] :ROSCillator:COUPling?</code> |
| 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:               | <b>Input/Output, Freq Ref In</b>  |
| 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                | <b>Input/Output</b> |
| Instrument S/W Revision | Prior to A.02.00    |

## 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.

|                          |   |
|--------------------------|---|
| <b>Remote Command:</b>   | <code>:TRIGger   TRIGger1   TRIGger2 [ :SEQuence ] :OUTPut</code><br><code>HSWP   MEASuring   MAIN   GATE   GTRigger   OEVen</code><br><code>:TRIGger   TRIGger1   TRIGger2 [ :SEQuence ] :OUTPut?</code> |
| Example:                 | TRIG:OUTP HSWP  |
| Preset:                  | Trigger 1: Sweeping (HSWP)<br>Trigger 2: Gate<br>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:                | <b>Input/Output, Output Config</b>  |
| Instrument S/W Revision: | Prior to A.02.00  |

## Input/Output

### Polarity

Sets the output to the Trig 1 Out connector to trigger on either the positive or negative polarity.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | :TRIGger TRIGger1 TRIGger2[:SEQUence]:OUTPut:POLarity<br>POSitive NEGative<br><br>: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:                | <b>Input/Output, Output Config, Trig 1 Output</b>  |
| 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:                | <b>Input/Output, Output Config, Trig 1 Output</b> |
| 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:                | <b>Input/Output, Output Config, Trig 1 Output</b> |
| 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: | <b>Input/Output, Output Config, Trig 1 Output</b> |
| 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**

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

## Input/Output

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                | <b>Input/Output, Output Config, I/Q Cal Out</b> |
| 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                | <b>Input/Output, Output Config, I/Q Cal Out</b> |
| 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                | <b>Input/Output, Output Config, I/Q Cal Out</b> |
| 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.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | :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                | <b>Input/Output, I/Q, I/Q Cable Calibration</b>  |
| 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.<br><br>When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see <a href="#">“Exit Confirmation” on page 336</a> ). |
| Key Path                | <b>Input/Output, I/Q, I/Q Cable Calibration</b>  |
| Instrument S/W Revision | Prior to A.02.00   |

### I/Q Isolation Calibration Time (Remote Command Only)

Return the last date and time that the I/Q Isolation Calibration was performed. This is a remote query command only.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | :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                | <b>Input/Output, I/Q, Q Setup, Q Probe, Calibrate</b> |
| Instrument S/W Revision | Prior to A.02.00                                      |

## Input/Output

### Next

Perform the I port calibration.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | :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.<br><br>The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands. |
| Remote Command Notes    | The I port must be connected to the Cal Out port before issuing the SCPI command.  |
| Example                 | CAL:IQ:FLAT:I  |
| Key Path                | <b>Input/Output, I/Q, I/Q Cable Calibration</b>  |
| 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.<br><br>When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see <a href="#">“Exit Confirmation”</a> on page 336). |
| Key Path                | <b>Input/Output, I/Q, I/Q Cable Calibration</b>   |
| 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                | <b>Input/Output, I/Q, I/Q Cable Calibration</b>  |
| Instrument S/W Revision | Prior to A.02.00   |

**Next**

Perform the I-bar port calibration.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | :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.<br><br>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                | <b>Input/Output, I/Q, I/Q Cable Calibration</b>  |
| 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.<br><br>When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see <a href="#">“Exit Confirmation”</a> on page 336). |
| Key Path                | <b>Input/Output, I/Q, I/Q Cable Calibration</b>   |
| 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                | <b>Input/Output, I/Q, I/Q Cable Calibration</b>  |
| Instrument S/W Revision | Prior to A.02.00   |

## Input/Output

### Next

Perform the Q port calibration.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | :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.<br><br>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                | <b>Input/Output, I/Q, I/Q Cable Calibration</b>  |
| 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.<br><br>When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see <a href="#">“Exit Confirmation” on page 336</a> ). |
| Key Path                | <b>Input/Output, I/Q, I/Q Cable Calibration</b>  |
| 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                | <b>Input/Output, I/Q, I/Q Cable Calibration</b>  |
| Instrument S/W Revision | Prior to A.02.00   |



**Next**

Perform the Q-bar port calibration.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | :CALibration:IQ:FLATness:QBAR  |
| 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.<br><br>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                 | CAL:IQ:FLAT:QBAR   |
| Key Path                | <b>Input/Output, I/Q, I/Q Cable Calibration</b>  |
| 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.

|                         |   |
|-------------------------|---|
| 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.<br><br>When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see <a href="#">“Exit Confirmation”</a> on page 336). |
| Key Path                | <b>Input/Output, I/Q, I/Q Cable Calibration</b>   |
| Instrument S/W Revision | Prior to A.02.00  |

**I/Q Cable Calibration Time (Remote Command 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.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | :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|B|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 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 335](#).

#### Notes

Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached.

|                         |   |
|-------------------------|---|
| Key Path                | <b>Input/Output, I/Q, I Setup, I Probe, Calibrate</b> |
| Instrument S/W Revision | Prior to A.02.00                                      |

**Back**

Return to the prior step in the calibration procedure.

|                         |   |
|-------------------------|---|
| Key Path                | <b>Input/Output, I/Q, Q Setup, Q Probe, Calibrate</b> |
| Instrument S/W Revision | Prior to A.02.00                                      |

**Next**

Perform the I port calibration.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | <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.<br><br>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                | <b>Input/Output, I/Q, I Setup, I Probe, Calibrate</b>   |
| 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.<br><br>When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see <a href="#">“Exit Confirmation” on page 336</a> ). |
| Key Path                | <b>Input/Output, I/Q, I Setup, I Probe, Calibrate</b>  |
| 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.

## Input/Output

### Show Adapter

Show a connection diagram and instructions for the probe and adapter. See [“Show Adapter Screen” on page 335](#).

|                         |   |
|-------------------------|---|
| Restriction and Notes   | Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached. |
| Key Path                | <b>Input/Output, I/Q, I Setup, I Probe, Calibrate</b>   |
| 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                | <b>Input/Output, I/Q, I Setup, I Probe, Calibrate</b>  |
| Instrument S/W Revision | Prior to A.02.00   |

### Next

Perform the I-bar port calibration.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | <code>:CALibration:IQ:PROBe:IBar</code>   |
| Remote Command Notes    | The I-bar port must be connected to the Cal Out port before issuing the SCPI command.<br><br>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:IB</code>   |
| Key Path                | <b>Input/Output, I/Q, I Setup, I Probe, Calibrate</b>   |
| 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.<br><br>When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see <a href="#">“Exit Confirmation” on page 336</a> ). |
|-----------------------|--|

|                         |   |
|-------------------------|---|
| Key Path                | <b>Input/Output, I/Q, I Setup, I Probe, Calibrate</b> |
| 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 335](#).

|                         |   |
|-------------------------|---|
| Restriction and Notes   | Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached. |
| Key Path                | <b>Input/Output, I/Q, Q Setup, Q Probe, Calibrate</b>   |
| Instrument S/W Revision | Prior to A.02.00  |

### Back

Return to the prior step in the calibration procedure.

|                         |   |
|-------------------------|---|
| Key Path                | <b>Input/Output, I/Q, Q Setup, Q Probe, Calibrate</b> |
| Instrument S/W Revision | Prior to A.02.00                                      |

### Next

Perform the Q port calibration.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | <code>:CALibration:IQ:PROBe:Q</code>  |
| Remote Command Notes    | The Q port must be connected to the Cal Out port before issuing the SCPI command.<br><br>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:Q</code>  |
| Key Path                | <b>Input/Output, I/Q, Q Setup, Q Probe, Calibrate</b>   |
| 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 336](#)).

**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 335](#).

**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** :CALibration:IQ:PROBe:QBar

|                         |   |
|-------------------------|---|
| Remote Command Notes    | The Q-bar port must be connected to the Cal Out port before issuing the SCPI command.<br><br>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:QB  |
| Key Path                | <b>Input/Output, I/Q, Q Setup, Q Probe, Calibrate</b>   |
| 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.<br><br>When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see <a href="#">“Exit Confirmation” on page 336</a> ). |
| Key Path                | <b>Input/Output, I/Q, Q Setup, Q Probe, Calibrate</b>  |
| 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 Command 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.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | :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

The Marker front-panel key activates 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 the selected window. If the metrics window is selected, the Marker will appear in the first visible window (RF Spectrum if Quad View is selected).

The units of Delta Marker are window dependent. In the Spectrum windows they are dB, in the Demod Waveform window they are the same as the Y-Axis Unit. In this window delta marker is a linear difference rather than a ratio. For example, in FM, in the Demod Waveform window, the units of delta marker are Hz.

### Control Mode

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | :CALCulate:AM FM PM:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MODE POSITION DELTA FIXed OFF<br>:CALCulate:AM FM PM:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MODE? |
| Preset:                  | OFF (all markers)  |
| Remote Command Notes:    | This command (not the query) causes the specified marker to become selected.   |
| Example:                 | CALC:AM:MARK:MODE POS<br>turns on marker 1 in Normal mode  |
| Key Path:                | <b>Front-panel key</b>   |
| Instrument S/W Revision: | Prior to A.02.00   |

### Select Marker

Displays the menu keys that enable you to select, set up, and control the markers for the current measurement.

|                         |   |
|-------------------------|---|
| Key Path                | <b>Marker</b>   |
| Preset                  | Marker 1  |
| State Saved             | The number of the selected marker is saved in instrument state. |
| Instrument S/W Revision | Prior to A.02.00  |

## Marker

### Normal

Sets the control mode for the selected marker to Normal and turns on the active function for setting its value. If the selected marker was off, it is placed at the center of the screen on the trace specified by the marker's Trace attribute.

A Normal mode (POSITION type) marker can be moved to any point on the X Axis by specifying its X Axis value. Its absolute Y Axis value is then the value of the trace point at that X Axis value.

|                          |   |
|--------------------------|---|
| Example:                 | : CALC: MARK: MODE POS<br>sets Marker 1 to Normal.  |
| Dependencies/Couplings:  | The marker addressed by this command becomes the selected marker on the front panel.                |
| Remote Command Notes:    | See the description under the <b>Marker</b> key.  |
| State Saved:             | The marker control mode (Normal, Delta, Fixed, Off) and X Axis value are saved in instrument state. |
| Key Path:                | <b>Marker</b>   |
| Instrument S/W Revision: | Prior to A.02.00  |

### Delta

Sets the control mode for the selected marker to Delta and turns on the active function for setting its delta value. If the selected marker was off, it is placed at the center of the screen on the trace specified by the marker's Trace attribute.

In Delta mode the marker result shows the relative result between the selected (Delta) marker and its reference marker. A delta marker can be moved to any point on the X Axis by specifying its X Axis offset from a reference marker. Its absolute Y Axis value is then the value of the trace point at that X Axis value.

|                          |   |
|--------------------------|---|
| Example:                 | :CALC:MARK:MODE DELT<br>sets marker 1 to Delta.   |
| Dependencies/Couplings:  | Coupled to fix absolute X when turned On.   |
| Remote Command Notes:    | See the description under the <b>Marker</b> key.  |
| State Saved:             | The marker control mode (Normal, Delta, Fixed, Off) and X Axis value are saved in instrument state. |
| Key Path:                | <b>Marker</b>   |
| Instrument S/W Revision: | Prior to A.02.00  |

### Fixed

Sets the control mode for the selected marker to Fixed. A fixed marker is fixed in the sense that it stays where you place it. It can be directly moved in both X and Y. It can be moved with a Peak Search. It can also be indirectly moved by re-zeroing the delta if it is a relative marker. If it is moved, it again becomes

fixed at the X Axis point it moved to and it has a Y-axis result that it took on when it moved there. If a Normal or Delta marker is changed to Fixed it becomes fixed at the X Axis point it was at, and with the Y-axis result it had when it was set to Fixed.

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

### Marker X

The command below sets and queries a marker's X value.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | :CALCulate:AM FM PM:MARKer [1]   2   3   4   5   6   7   8   9   10   11   12 :<br>X <time> <freq><br><br>:CALCulate:AM FM PM:MARKer [1]   2   3   4   5   6   7   8   9   10   11   12 :<br>X?      |
| Preset:                  | After a preset, all Markers are turned OFF, so Marker X Axis Value query will return not a number (NAN). When Marker is On, default value of Marker X value is the center of the appropriate window. |
| Min:                     | -9.9E+37   |
| Max:                     | 9.9E+37  |
| Remote Command Notes:    | The query is returned in the fundamental units for the current marker X Axis scale. This command (not the query) causes the specified marker to become selected                                      |
| Key Path:                | <b>Marker, Fixed</b>   |
| Instrument S/W Revision: | Prior to A.02.00   |

### Marker Y

The command below sets and queries a marker's Y axis value.

|                        |  |
|------------------------|--|
| <b>Remote Command:</b> | :CALCulate:AM FM PM:MARKer [1]   2   3   4   5   6   7   8   9   10   11   12 :<br>Y <real><br><br>:CALCulate:AM FM PM:MARKer [1]   2   3   4   5   6   7   8   9   10   11   12 :<br>Y? |
| Preset:                | Defaults to the measurement result at the default X value. Not a number (NAN) if off, or if off screen is Fixed.   |
| Min:                   | -9.9E+37   |
| Max:                   | 9.9E+37  |
| Remote Command Notes:  | The query is returned in the fundamental units for the current marker Y Axis scale. This command (not the query) causes the specified marker to become selected.                         |
| Key Path:              | <b>Marker, Fixed</b>   |

## Marker

Instrument S/W Revision: Prior to A.02.00

### Off

Turns off the selected marker. Turning the marker off does not affect which marker is selected.

Example: : CALC: MARK: MODE OFF  
sets Marker 1 to Off.

Remote Command Notes: See the description under the **Marker** key.

State Saved: The marker control mode (Normal, Delta, Fixed, Off) is saved in instrument state.

Key Path: **Marker**

Instrument S/W Revision: Prior to A.02.00

### Properties

Accesses a menu used to assign properties to the selected marker.

Key Path **Marker**

Instrument S/W Revision Prior to A.02.00

### Select Marker

Displays the menu key that enables you to select, set up, and control the 12 markers for the current measurement.

Key Path **Marker, Properties**

Preset Marker 1

State Saved The number of the selected marker is saved in instrument state.

Instrument S/W Revision Prior to A.02.00

### Relative To

Selects the reference marker for a marker in Delta mode.

If a delta marker has a reference marker in a different window, the delta marker's mode changes to POS (for example, it becomes a normal marker).

**Remote Command:** :CALCulate:AM|FM|PM:MARKer[1]|2|3|4|5|6|7|8|9|10|11|12:  
REFerence <int>  
:CALCulate:AM|FM|PM:MARKer[1]|2|3|4|5|6|7|8|9|10|11|12:  
REFerence?

|                          |   |
|--------------------------|---|
| Preset:                  | By default, marker X is relative to marker X+1 except for marker 12, which is relative to marker 1.   |
| Min:                     | 1   |
| Max:                     | 12  |
| Remote Command Notes:    | This command (not the query) causes the specified marker to become selected                           |
| Example:                 | CALC:AM:MARK1:REF 2<br>sets marker 1's reference marker to 2 and turns marker 1 on as a delta marker. |
| Key Path:                | <b>Marker, Properties</b>   |
| Instrument S/W Revision: | Prior to A.02.00  |

### Marker Trace

Selects the trace on which to place the marker. A marker is associated with one and only one trace. This trace is used to determine the placement, result, and X Axis Scale of the marker. All markers have an associated trace, even **Fixed** markers. It is from that trace that they determine their attributes and behaviors, and it is to that trace that they go when they become Normal or Delta markers.

In the Analog Demod mode, there are five named traces. The RF Spectrum trace is the trace in the RF Spectrum window, and the AF Spectrum trace is the trace in the AF Spectrum window. There are four traces in the Demod Waveform window: Demod, Demod Avg, Demod Max, and Demod Min.

When Auto Init is true, the marker's trace attribute is re-determined automatically by the analyzer whenever the marker turns on (Normal, Delta, or Fixed) from an Off state. In this case, the marker will go to the trace in the window that has the focus, or onto the RF spectrum window if the Metrics window has the focus. If in the Demod Waveform window, it goes to the Demod trace.

This command associates the marker with the specified trace. Setting the Marker Trace directly (whether the marker is on or off) will turn off Auto Init.

If the marker is not **off**, it moves the marker from the trace it was on to the new trace. If the new trace is in the same window, the marker goes to the same data point on the new trace. If the marker changes windows, it retains its relative horizontal positions in the new window; if it is a fixed marker, it will retain both relative horizontal and vertical position.

If the marker is **off** it stays off, but is now associated with the specified trace.

The query returns the name of the trace on which the marker is currently placed.

|                        |   |
|------------------------|---|
| <b>Remote Command:</b> | :CALCulate:AM FM PM:MARKer [1]   2   3   4   5   6   7   8   9   10   11   12 :<br>TRACe<br>RFSpectrum AFSpectrum DEMod DAverage DMAximum DMINimum<br>:CALCulate:AM FM PM:MARKer [1]   2   3   4   5   6   7   8   9   10   11   12 :<br>TRACe? |
| Example:               | :CALC:AM:MARK1:TRAC DEM<br>places marker 1 on the demod trace   |

## Marker

|                          |   |
|--------------------------|---|
| Dependencies/Couplings:  | This is not affected by Auto Coupling.<br>Sending the remote command causes the addressed marker to become selected.<br>If ever a delta marker has a reference marker in a different window, the delta marker's mode changes to POS (for example, it becomes a normal marker).<br>When Marker Trace Auto Init State is on, the marker trace will automatically be set whenever the marker is turned on. |
| Preset:                  | RF Spectrum Presets on Preset or All Markers Off  |
| State Saved:             | The Marker Trace for each marker is saved in state.   |
| Key Path:                | <b>Marker, Properties</b>   |
| Instrument S/W Revision: | Prior to A.02.00  |

### RF Spectrum

Selects the input RF signal in the RF Spectrum window as the trace that you want your marker to be placed on. This trace is used to determine the placement, result, and X Axis Scale of the marker.

|                         |   |
|-------------------------|---|
| Key Path                | <b>Marker, Properties, Marker Trace</b> |
| Example                 | :CALC:AM:MARK1:TRAC RFSP                |
| Instrument S/W Revision | Prior to A.02.00                        |

### Demod

Selects the current demodulated signal in the Demod Waveform window, shown in yellow, as the trace that you want your marker to be placed on. This trace is used to determine the placement, result, and X Axis Scale of the marker.

|                         |   |
|-------------------------|---|
| Key Path                | <b>Marker, Properties, Marker Trace</b> |
| Example                 | :CALC:AM:MARK1:TRAC DEM                 |
| Instrument S/W Revision | Prior to A.02.00                        |

### Demod Average

Selects the averaged demodulation signal in the Demod Waveform window, shown in green, as the trace that you want your marker to be placed on. This trace is used to determine the placement, result, and X Axis Scale of the marker.

|                          |   |
|--------------------------|---|
| Example:                 | :CALC:AM:MARK1:TRAC DAV                 |
| Key Path:                | <b>Marker, Properties, Marker Trace</b> |
| Instrument S/W Revision: | Prior to A.02.00                        |

**Demod Max**

Selects the Demod Max trace in the Demod Waveform window, shown in cyan, as the trace that you want your marker to be placed on. This trace shows the maximum hold value for each data point since the last restart.

Example: :CALC:AM:MARK1:TRAC DMAX

Key Path: **Marker, Properties, Marker Trace**

Instrument S/W Revision: Prior to A.02.00

**Demod Min**

Selects the Demod Min trace in the Demod Waveform window, shown in magenta, as the trace that you want your marker to be placed on. This trace shows the minimum hold value for each data point since the last restart.

Example: :CALC:AM:MARK1:TRAC DMIN

Key Path: **Marker, Properties, Marker Trace**

Instrument S/W Revision: Prior to A.02.00

**AF Spectrum**

Selects the demodulated signal in the AF Spectrum window as the trace that you want your marker to be placed on.

Example: :CALC:AM:MARK1:TRAC AFSP

Key Path: **Marker, Properties, Marker Trace**

Instrument S/W Revision: Prior to A.02.00

**Trace Auto Init On Off**

Selects whether the marker trace is automatically reset to the selected window when the marker is turned on or not.

**Remote Command:** :CALCulate:AM|FM|PM:MARKer[1]|2|3|4|5|6|7|8|9|10|11|12:  
TRACe:AUTO OFF|ON|0|1

:CALCulate:AM|FM|PM:MARKer[1]|2|3|4|5|6|7|8|9|10|11|12:  
TRACe:AUTO?

Example: :CALC:AM:MARK1:TRAC:AUTO 0  
turns off auto-initialization of marker trace.

Preset: On

State Saved: Saved in instrument state.

Key Path: **Marker, Properties, Trace**

## Marker

Instrument S/W Revision: Prior to A.02.00

### Lines

When on, displays a vertical line of graticule height and a horizontal line of graticule width, intersecting at the indicator point of the marker (that is, the center of the X or the bottom tip of the diamond). The lines are blue in color.

If the marker is off screen, the lines should be extended from the marker so that they go through the screen area if possible. This is really useful for off screen Fixed markers as it lets you see their amplitude even though they are off the X Axis.

**Remote Command:** :CALCulate:AM|FM|PM:MARKer [1] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 :  
LINES [ :STATe] OFF|ON|0|1

:CALCulate:AM|FM|PM:MARKer [1] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 :  
LINES [ :STATe] ?

Example: CALC:AM:MARK2:LIN ON  
turns Lines on for marker 2.

Dependencies/Couplings: none  
Sending the remote command causes the addressed marker to become selected.

Preset: OFF

State Saved: Saved in State

Key Path: **Marker, Properties**

Instrument S/W Revision: Prior to A.02.00

### All Markers Off

Turns off all markers.

**Remote Command:** :CALCulate:AM|FM|PM:MARKer:AOFF

Example: CALC:AM:MARK:AOFF  
turns off all markers for the AM measurement

Dependencies/Couplings: Sets the selected marker to 1.

Key Path: **Marker**

Instrument S/W Revision: Prior to A.02.00



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## Marker Function

There are no menus under this key in the Analog Demod mode.

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

## Marker Function

---

## Marker To

Accesses a menu that contains only the marker center frequency key.

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

### Mkr->CF

Sets the center frequency of the RF Spectrum window to the frequency of the selected marker. The marker stays at this frequency, so it moves to the center of the display. In delta marker mode, this function sets the center frequency to the x-axis value of the delta marker.

**Remote Command:** :CALCulate:AM|FM|PM:MARKer [1] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 [ :SET] :CENTer

**Example:** CALC:AM:MARK2:CENT  
sets the CF of the analyzer to the value of marker 2.

**Dependencies/Couplings:** This function is unavailable (key is grayed out) unless the selected marker's trace is off, or on the RF Spectrum trace.

All the usual couplings associated with setting Center Frequency apply (see the Frequency Section).

**Remote Command Notes:** Sending this command selects the sub-op coded marker.

If the currently selected marker is not on when this key is pressed, it will be turned on at the center of the RF Spectrum trace as a normal type marker.

**Key Path:** **Marker ->**

**Instrument S/W Revision:** Prior to A.02.00

**Marker To**

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## Meas

Accesses a menu that contains three measurements: AM, FM, and PM (Phase Modulation).

Key Path

**Front-panel key**

Instrument S/W Revision

Prior to A.02.00

**Meas**

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## Meas Setup

### Overview

This section describes the measurement setup features of the Analog Demod measurements.

### Set Parameters

The following parameters are set as indicated, are not settable by the user and therefore do not appear in any menus:

|                          |             |
|--------------------------|-------------|
| FFT IF Gain              | Low (0 dB)  |
| ADC Dither               | On          |
| Avg Mode                 | Exponential |
| Phase Noise Optimization | Auto        |

### Auto Rules for Phase Noise Optimization:

Use “Optimize for  $f < 20$  kHz” when Channel BW  $< 120$  kHz, otherwise use “Optimize for  $f > 30$  kHz”.

[“Optimizing Measurement Speed” on page 351](#)

[“Channel Bandwidth” on page 351](#)

[“RF Spectrum Span ” on page 352](#)

[“RF Spectrum RBW / AF Spectrum RBW” on page 352](#)

[“AF Waveform Sweep Time” on page 352](#)

[“Filters and Annotation” on page 352](#)

### Optimizing Measurement Speed

The speed of the analog demodulation measurements is driven largely by how much data must be acquired to satisfy the selected configuration.

Each measurement cycle generates all of the metrics and traces from a single acquisition, so there are several different settings which can affect the overall speed. Note that even though you may not be viewing a particular result on the display, the result is available and its configuration and constraints are used to determine our acquisition settings.

### Channel Bandwidth

This setting determines the sampling rate used by the measurement, higher bandwidths will result in larger data sets being acquired and processed. This should be set to the lowest value possible which allows your signal to be fully captured.

## RF Spectrum Span

This setting is used in a similar fashion as the Channel Bandwidth in that it determines our sampling rate. As with channel bandwidth, it should be set as narrow as possible to capture the signal of interest.

## RF Spectrum RBW / AF Spectrum RBW

These settings dictate a minimum acquisition time for the measurement. The Auto setting is recommended for optimal performance while maintaining measurement integrity. Narrower RBWs require longer acquisitions to achieve the resolution improvements.

## AF Waveform Sweep Time

This setting sets another minimum acquisition time for the measurement. In many uses, the AF Spectrum RBW will dominate the determination of the data acquisition duration, but if the AF waveform view is not needed keeping its sweep time low will ensure that it does not negatively impact the throughput.

## Filters and Annotation

You may choose to filter by frequency – choosing an optional low-pass filter and an optional high-pass filter – or may filter using a standard published band-pass filter (CCITT). Turning on a band-pass filter will automatically turn off the high-pass and low-pass filters; similarly, the band-pass filter will automatically turn off if you request either a high-pass or a low-pass filter.

Accesses a menu of keys that enable you to control specific parameters for the current measurement.

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

## Average/Hold Num On/Off

When Average/Hold is turned on, the RF Spectrum and AF spectrum traces are averaged, and the Demod window shows an Average trace, a Max Hold trace, and a Min Hold trace in addition to the current trace. All metrics are averaged, and the metrics show an “Average” column and a “Max Hold” column.

The average feature for the Analog Demod measurement differs from other measurements in that the average type is fixed depending on the window as shown in the table below.

| Window            | Average Type          |
|-------------------|-----------------------|
| RF Spectrum       | Pwr Average           |
| Demod<br>Waveform | Arithmetic<br>Average |
| AF Spectrum       | Log Average           |



For more details, see “Average/Hold On/Off Functionality” on page 353 below the table.

|                          |   |
|--------------------------|---|
| <b>Remote Command:</b>   | [ :SENSE ] :AM   FM   PM :AVERAge :COUNT <integer><br>[ :SENSE ] :AM   FM   PM :AVERAge :COUNT ?<br>[ :SENSE ] :AM   FM   PM :AVERAge [ :STATe ] ON   OFF   1   0<br>[ :SENSE ] :AM   FM   PM :AVERAge [ :STATe ] ? |
| Example:                 | AM:AVER:COUN 10   |
| Preset:                  | 10<br>ON  |
| State Saved:             | Saved in Instrument State   |
| Min:                     | 1   |
| Max:                     | 9999  |
| Key Path:                | <b>Meas Setup</b>   |
| Instrument S/W Revision: | Prior to A.02.00  |

### Average/Hold On/Off Functionality

Average, Minhold, and Maxhold are coupled.

When Average/Hold is on:

- The RF Spectrum and AF Spectrum traces are averaged.
- The Demod Waveform window will display a current trace, an Average trace, a Max Hold trace, and a Min Hold trace.
- The Metrics window will display an “Average” column and a “Max Hold” column.
- Metrics will display to four significant digits.
- The Meas Bar will display the Average/Hold number (along with how many of those sweeps have been captured).
- Demod Min trace, Demod Max trace and Demod Avg trace are maintained.
- The Max Hold column shows the maximum value the unaveraged metric has attained since the last Restart.

When Average/Max Hold is off:

- The RF Spectrum and AF Spectrum traces are not averaged.
- The Demod Waveform window will display only the demod trace.
- The Metrics window will display only a “Current” column.
- Metrics will display to two significant digits.
- The Meas Bar will not display the Average/Hold number.

## Meas Setup

- Max Hold metrics over SCPI will return Scpi NaN.
- Demod Min trace, Demod Max trace and Demod Avg trace will return default values in a Meas?, Read? and Fetch? and when exported to a .csv file
- Max Hold column is blank.

## Filters

Pressing this key displays the Filters menu, allowing the user to control the post demodulation and de-emphasis filters.

If any filters are turned on and the filters cannot be applied, the error “161 Setting Modified; Filters not applied” will appear.

|                         |                   |
|-------------------------|-------------------|
| Key Path                | <b>Meas Setup</b> |
| Instrument S/W Revision | Prior to A.02.00  |

### High Pass Filter (Post Demod)

This parameter allows you to adjust the post demodulation high pass filters. This filter allows you to remove unwanted low-frequency components from the modulated signal.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | <code>[[:SENSE]:AM FM PM:HPfilter OFF HPF20 HPF50 HPF300</code><br><code>[[:SENSE]:AM FM PM:HPfilter?</code>   |
| Example:                 | FM:HPF HPF20   |
| Dependencies/Couplings:  | None<br><br>Turning on any high-pass filter will turn off bandpass filters.<br><br>If a band-pass filter is turned off, the following advisory message is displayed:<br>“Band-pass filter set to OFF”.<br><br>If the band-pass filter was already off, no advisory message is displayed. |
| Remote Command Notes:    | Off = No filtering<br><br>HPF20 = Use 20 Hz high pass filter<br><br>HPF50 = Use 50 Hz high pass filter<br><br>HPF300 = Use 300 Hz high pass filter   |
| Preset:                  | Off  |
| State Saved:             | Saved in State   |
| Key Path:                | <b>Meas Setup</b>  |
| Instrument S/W Revision: | Prior to A.02.00   |

**Off**

This selection turns the post demodulation high pass filter off.

Example: AM:HPF OFF  
 Key Path: **Meas Setup, HPF**  
 Instrument S/W Revision: Prior to A.02.00

**20 Hz**

Sets the post demodulation high pass filter to 20 Hz.

Example: AM:HPF HPF20  
 Key Path: **Meas Setup, HPF**  
 Instrument S/W Revision: Prior to A.02.00

**50 Hz**

Sets the post demodulation high pass filter to 50 Hz.

Example: AM:HPF HPF50  
 Key Path: **Meas Setup, HPF**  
 Instrument S/W Revision: Prior to A.02.00

**300 Hz**

Sets the post demodulation high pass filter to 300 Hz.

Example: AM:HPF HPF300  
 Key Path: **Meas Setup, HPF**  
 Instrument S/W Revision: Prior to A.02.00

**Lowpass Filter (Post Demod)**

This parameter allows you to adjust the post demodulation low pass filter. The filter is useful in removing unwanted high frequency components of the modulating signal.

**Remote Command:** [:SENSe] :AM|FM|PM:LPFfilter  
 OFF|LPF300|LPF3K|LPF15K|LPF30K|LPF80K|LPF300K  
 [:SENSe] :AM|FM|PM:LPFfilter?

Example: FM:LPF LPF3K

## Meas Setup

|                          |  |
|--------------------------|--|
| Dependencies/Couplings:  | LPF key is unavailable (grayed out) when the CCITT filter is selected.<br>Turning on any low-pass filter will turn off band-pass filters.<br>If a band-pass filter is turned off, the following advisory message is displayed:<br>“Band-pass filter set to OFF”.<br>If the band-pass filter was already off, no advisory message is displayed. |
| Remote Command Notes:    | Off = No filtering<br>LPF300 = Use 300 Hz low pass filter<br>LPF3K = Use 3 kHz low pass filter<br>LPF15K = Use 15 kHz low pass filter<br>LPF30K = Use 30 kHz low pass filter<br>LPF80K = Use 80 kHz low pass filter<br>LPF300K = Use 300 kHz low pass filter   |
| Preset:                  | Off  |
| State Saved:             | Saved in State   |
| Key Path:                | <b>Meas Setup</b>  |
| Instrument S/W Revision: | Prior to A.02.00   |

### Off

Turns the post demodulation low pass filter off.

|                          |                                   |
|--------------------------|-----------------------------------|
| Example:                 | AM:LPF OFF                        |
| Key Path:                | <b>Meas Setup, Post Demod LPF</b> |
| Instrument S/W Revision: | Prior to A.02.00                  |

### 300 Hz

Sets the post demodulation low pass filter to 300 Hz.

|                          |                            |
|--------------------------|----------------------------|
| Example:                 | AM:HPBP LPF300             |
| Key Path:                | <b>Meas Setup, HPF/LPF</b> |
| Instrument S/W Revision: | Prior to A.02.00           |

### 3 kHz

Selects the 3 kHz post demodulation low pass filter.

|           |                                   |
|-----------|-----------------------------------|
| Example:  | AM:LPF LPF3K                      |
| Key Path: | <b>Meas Setup, Post Demod LPF</b> |

Instrument S/W Revision: Prior to A.02.00

### 15 kHz

Selects the 15 kHz post demodulation low pass filter.

Example: AM:LPF LPF15K  
 Key Path: **Meas Setup, Post Demod LPF**  
 Instrument S/W Revision: Prior to A.02.00

### 30 kHz

Selects the 30 kHz post demodulation low pass filter.

Example: AM:LPF LPF30K  
 Key Path: **Meas Setup, Post Demod LPF**  
 Instrument S/W Revision: Prior to A.02.00

### 80 kHz

Selects the 80 kHz post demodulation low pass filter.

Example: AM:LPF LPF80K  
 Key Path: **Meas Setup, Post Demod LPF**  
 Instrument S/W Revision: Prior to A.02.00

### 300 kHz

Selects the 300 kHz post demodulation low pass filter.

Example: AM:LPF LPF300K  
 Key Path: **Meas Setup, Post Demod LPF**  
 Instrument S/W Revision: Prior to A.02.00

### Band Pass Filter (Post Demod)

This parameter enables you to choose the post demodulation band pass filters, allowing you to apply industry-defined filters.

**Remote Command:** [:SENSe]:AM|FM|PM:BPFfilter OFF|CCITT  
 [:SENSe]:AM|FM|PM:BPFfilter?

Example: FM:BPF CCITT

## Meas Setup

|                          |  |
|--------------------------|--|
| Dependencies/Couplings:  | None<br>Turning on any bandpass filter will turn off high-pass and low-pass filters.<br>If a high-pass filter is turned off, the following advisory message is displayed:<br>“High-pass filter set to OFF”.<br>If a low-pass filter is turned off, the following advisory message is displayed:<br>“Low-pass filter set to OFF”.<br>If both are turned off, the following advisory message is displayed:<br>“High-pass and Low-pass filters set to OFF”.<br>If both high-pass and low-pass filters were already off, no advisory message is displayed. |
| Remote Command Notes:    | Off = No filtering<br>CCITT = Use CCITT filter   |
| Preset:                  | Off  |
| State Saved:             | Saved in State   |
| Key Path:                | <b>Meas Setup</b>  |
| Instrument S/W Revision: | Prior to A.02.00   |

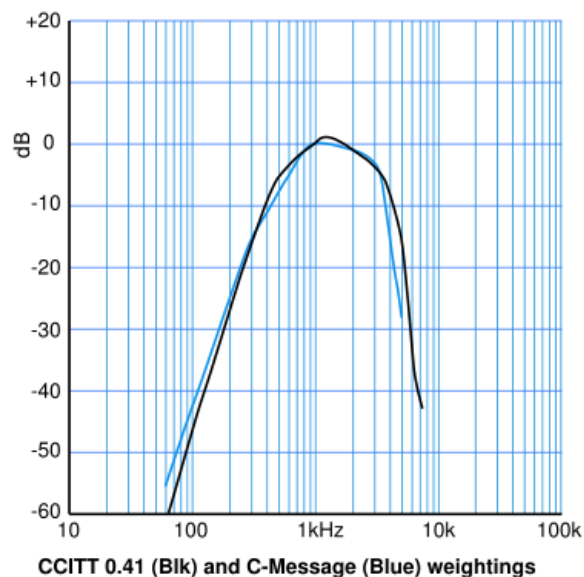
### Off

This selection turns the post demodulation band-pass filter off.

|                          |                        |
|--------------------------|------------------------|
| Example:                 | AM:BPF OFF             |
| Key Path:                | <b>Meas Setup, BPF</b> |
| Instrument S/W Revision: | Prior to A.02.00       |

## CCITT

Sets the post demodulation band-pass filter to CCITT.



Example: AM:BPF CCITT  
 Key Path: Meas Setup, BPF  
 Instrument S/W Revision: Prior to A.02.00

### De-emphasis (FM Demod measurement only)

Controls a single-pole filter, usually 6 dB/octave roll off, to counter intentional pre-emphasis in the transmitter. When the De-emphasis state is OFF the hardware digital filter is bypassed, otherwise the setting is applied

US75 is recommended for US commercial FM 75  $\mu$ s pre-emphasis.

The De-emphasis key only appears in the Meas Setup menu for the FM Demod measurement. It is unavailable for the AM and M measurements.

**Remote Command:** [:SENSe]:FM:DEEMphasis OFF|US25|US50|US75|US750  
 [:SENSe]:FM:DEEMphasis?

Example: FM:DEEM US75  
 FM:DEEM?

Dependencies/Couplings: Only available in FM measurement. Grayed out for AM and PM

Preset: OFF

State Saved: Saved in Instrument State

Key Path: **Meas Setup**

## Meas Setup

Instrument S/W Revision: Prior to A.02.00

### Off

Bypasses the De-emphasis filter.

Example: FM:DEEM OFF

Key Path: **Meas Setup, De-emphasis**

Instrument S/W Revision: Prior to A.02.00

### 25 $\mu$ s

Sets the De-emphasis time constant to 25  $\mu$ s.

Example: FM:DEEM US25

Key Path: **Meas Setup, De-emphasis**

Instrument S/W Revision: Prior to A.02.00

### 50 $\mu$ s

Sets the De-emphasis time constant to 50  $\mu$ s.

Example: FM:DEEM US50

Key Path: **Meas Setup, De-emphasis**

Instrument S/W Revision: Prior to A.02.00

### 75 $\mu$ s

Sets the De-emphasis time constant to 75  $\mu$ s.

Example: FM:DEEM US75

Key Path: **Meas Setup, De-emphasis**

Instrument S/W Revision: Prior to A.02.00

### 750 $\mu$ s

Sets the De-emphasis time constant to 750 usec.

Example: FM:DEEM US750

Key Path: **Meas Setup, De-emphasis**

Instrument S/W Revision: Prior to A.02.00



## Demod to Speaker

Controls whether a demodulated audio signal is connected to the speaker or not. This allows the demodulated audio to be turned off without completely disabling (muting) the instrument speaker. When the Analog Demod application is running, the demodulated signal can be heard from the speaker as long as the “Demod to Speaker” function is On

This selection or command is shared among all measurements in the mode, but not across other modes.

|                          |   |
|--------------------------|---|
| <b>Remote Command:</b>   | [ :SENSE] :SPEAKER [ :STATE] ON OFF 1 0<br>[ :SENSE] :SPEAKER [ :STATE] ? |
| Example:                 | SPE OFF<br>Disconnects demodulated audio from speaker circuit.            |
| Preset:                  | On  |
| State Saved:             | Saved in State  |
| Key Path:                | <b>Meas Setup</b>   |
| Instrument S/W Revision: | Prior to A.02.00  |

## Auto Scale

Auto Scale is used to automatically set many measurement parameters by pressing one button, based upon the current signal under test. The feature requires that the center frequency be set to the signal of interest, and works best on stable periodic signals. This measurement is preset at the beginning of the Auto Scale operation, with the exception that the user’s Center Frequency is maintained.

The signal is analyzed using an Occupied Bandwidth measurement to automatically set the RF Spectrum Span and Channel Bandwidth to good values. Once this is done, the software examines the demodulated signal and appropriately sets the Sweep Time and Demod Waveform Scale/Div.

There are no configurable parameters for Auto Scale. The function is pre-configured to work with most real-world use cases.

|                          |                      |
|--------------------------|----------------------|
| <b>Remote Command:</b>   | [ :SENSE] :AUTOScale |
| Example:                 | AUT                  |
| Key Path:                | <b>Meas Setup</b>    |
| Instrument S/W Revision: | Prior to A.02.00     |

## Meas Preset

This key returns the variables in the current measurement to their preset values.

|                         |                   |
|-------------------------|-------------------|
| Key Path                | <b>Meas Setup</b> |
| 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.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | :INSTrument [:SElect]<br>SA   BASIC   ADEMOD   NFIGURE   PNOISE   CDMA2K   TDSCDMA   VSA   VSA89<br>601   WCDMA   WIMAXOFDMA   EDGE GSM   CDMA1XEV   RLC<br>:<br>: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.<br><br>Once an instrument mode is selected, only the commands that are valid for that mode can be executed. |
| Key Path                | <b>Front-panel key</b>   |
| 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 368 for the mode order).

| Mode                          | :INSTRument:NSElect<br><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<br>(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                              | ADEMOD                           |
| 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<br><br>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.

|                          |   |
|--------------------------|---|
| <b>Remote Command:</b>   | :INSTRument :CATalog?   |
| Example:                 | :INST:CAT?  |
| Remote Command Notes:    | Query returns a quoted string of the installed and licensed modes separated with a comma. Example:<br><br>"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).

|                        |  |
|------------------------|--|
| <b>Remote Command:</b> | :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:<br><br>"N9060A"<br><br>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

|                          |   |
|--------------------------|---|
| <b>Remote Command:</b>   | :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:<br><br>"2FP"<br><br>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<br>INST:NSEL 1 |
| Key Path                | <b>Mode</b>                |
| 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<br>INST:NSEL 8 |
| Key Path                | <b>Mode</b>                   |
| 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<br>INST:NSEL 9 |
| Key Path                | <b>Mode</b>                   |
| 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<br>INST:NSEL 13 |
| Key Path                 | <b>Mode</b>                      |
| Instrument S/W Revision  | Prior to A.02.00                 |
| Modified at S/W Revision | A.02.00                          |

## Mode

### 802.16 OFDMA (WiMAX/WiBro)

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

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

|                         |                                     |
|-------------------------|-------------------------------------|
| Example                 | INST:SEL WIMAXOFDMA<br>INST:NSEL 75 |
| Key Path                | <b>Mode</b>                         |
| 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<br>INST:NSEL 100 |
| Key Path                | <b>Mode</b>                   |
| 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<br>or<br>INST:NSEL 14 |
|---------|---------------------------------------|

|                         |                  |
|-------------------------|------------------|
| Key Path                | <b>Mode</b>      |
| 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                | <b>Mode</b>      |
| 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                | <b>Mode</b>      |
| 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                | <b>Mode</b>      |
| Instrument S/W Revision | Prior to A.02.00 |

## Mode

### cdma2000

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

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

|                         |                                 |
|-------------------------|---------------------------------|
| Example                 | INST:SEL CDMA2K<br>INST:NSEL 10 |
| Key Path                | <b>Mode</b>                     |
| 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<br>INST:NSEL 15 |
| Key Path                | <b>Mode</b>                       |
| 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<br>INST:NSEL 102 |
| Key Path                | <b>Mode</b>                   |
| 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<br>INST:NSEL 235 |
| Key Path                | <b>Mode</b>                   |
| 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<br>INST:NSEL 236 |
| Key Path                | <b>Mode</b>                    |
| 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<br>INST:NSEL 19 |
| Key Path                | <b>Mode</b>                    |
| 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<br>INST:NSEL 81 |
| Key Path | <b>Mode</b>                         |

## 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, 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                | <b>Mode</b>                          |
| Example                 | INST:SEL WIMAXFIXED<br>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<br>INST:NSEL 103 |
| Key Path                | <b>Mode</b>                    |
| 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.

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**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<br>Or<br>INST:NSEL 266 |
|---------|-------------------------------------|

|                         |                  |
|-------------------------|------------------|
| Key Path                | <b>Mode</b>      |
| 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](http://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                | <b>Mode</b>      |
| Instrument S/W Revision | Prior to A.02.00 |

**Mode**



---

## Mode Setup

The functions in the Mode Setup menu are independent of which measurement is currently running; we say they are global to all measurements in the mode, or "Meas Global."

Most Meas Global functions are restored to their preset values by Mode Preset, however some variables are more persistent and are not preset until the Restore Mode Defaults key is pressed.

There are also a few Meas Global variables that can be switched to be Mode Global, that is, the same for all modes. The keys under the Global Settings key control whether these variables are Mode Global or not.

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

### Restore Mode Defaults

Resets the state of the currently active mode by resetting the mode persistent settings to their factory default values, clearing mode data and by performing a Mode Preset.

See also the Preset section in the Utility Functions section.

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

### Global Settings

Opens up a menu that allows you to switch certain Meas Global parameters to a Mode Global state. These switches apply to all modes which support global settings. For example, no matter what mode you are in when you set the "Global Center Frequency" switch to on, it applies to all modes which support Global Settings.

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

### Global Center Freq

The software maintains a Mode Global value called "Global Center Freq".

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

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

## Mode Setup

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

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

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

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | : INSTRument : COUPle : FREQuency : CENTer ALL   NONE<br>: INSTRument : COUPle : FREQuency : CENTer? |
| Key Path:                | <b>Mode Setup, Global Settings</b>   |
| Scope:                   | Mode Global  |
| Preset:                  | Off  |
| Preset:                  | Set to Off on Global Settings, Restore Defaults<br>and System, Restore Defaults, All Modes           |
| Instrument S/W Revision: | Prior to A.02.00   |

### Restore Defaults

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

|                          |                                    |
|--------------------------|------------------------------------|
| <b>Remote Command:</b>   | : INSTRument : COUPle : DEFault    |
| Key Path:                | <b>Mode Setup, Global Settings</b> |
| Instrument S/W Revision: | Prior to A.02.00                   |

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## Peak Search

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.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | :CALCulate:AM FM PM:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MAXimum |
| Example:                 | CALC:AM:MARK2:MAX  |
| Key Path:                | <b>Front-panel key</b>   |
| Instrument S/W Revision: | Prior to A.02.00   |

### Next Peak

Moves the selected marker to the peak that has the next highest amplitude less than the marker's current value. If there is no valid peak lower than the current marker position, an error is generated and the marker is not moved.

If the selected marker was off, then it is turned on as a normal marker and a peak search is performed.

In Analog Demod, the Peak Threshold and Peak Excursion functions are both OFF. If there is no valid peak to the right of the current marker position, an error is generated and the marker is not moved. If the selected marker was off, then it is turned on as a normal marker and a peak search is performed.

|                          |   |
|--------------------------|---|
| <b>Remote Command:</b>   | :CALCulate:AM FM PM:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MAXimum:NEXT   |
| Example:                 | CALC:AM:MARK2:MAX:NEXT<br>selects marker 2 and moves it to the peak that is closest in amplitude to the current peak, but the next lower value. |
| Remote Command Notes:    | Sending this command selects the specified marker   |
| State Saved:             | Not part of saved state   |
| Key Path:                | <b>Peak Search</b>  |
| Instrument S/W Revision: | Prior to A.02.00  |

### Pk-Pk Search

Finds and displays the amplitude and frequency (or time, if on a time domain trace) differences between the highest and lowest y-axis value. It places the selected marker on the minimum value on its selected trace and it places that marker's reference marker on the peak of its selected trace. This function turns on the reference marker and sets its mode to **Fixed** if it is not already on. (These markers may be on two different traces.)

When peak-to-peak search is successful, a message is displayed on the message line.

## Peak Search

If the selected marker is off, a delta type marker is turned on and the peak-to-peak search is done. If the selected marker is on, but it is not a delta marker, then it is changed to delta, which turns on the reference marker if needed. It then performs the peak-to-peak function.

|                          |   |
|--------------------------|---|
| <b>Remote Command:</b>   | :CALCulate:AM FM PM:MARKer [1]   2   3   4   5   6   7   8   9   10   11   12 :<br>PTPeak |
| Example:                 | CALC:AM:MARK:PTP<br>CALC:AM:MARK:Y?<br>queries the delta amplitude value for marker 1.    |
| Dependencies/Couplings:  | n/a<br><br>Selected marker becomes a delta marker if not already in delta mode.           |
| Remote Command Notes:    | Sending this command selects the specified marker   |
| State Saved:             | Not part of saved state   |
| Key Path:                | <b>Peak Search</b>  |
| Instrument S/W Revision: | Prior to A.02.00  |

## Min Search

Moves the selected marker to the minimum y-axis value on the current trace. If the selected marker is off, it is turned on before the minimum search is performed.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | :CALCulate:AM FM PM:MARKer [1]   2   3   4   5   6   7   8   9   10   11   12 :<br>MINimum |
| Example:                 | CALC:AM:MARK:MIN<br>selects marker 1 and moves it to the minimum amplitude value.          |
| Remote Command Notes:    | Sending this command selects the specified marker.   |
| State Saved:             | Not part of saved state  |
| Key Path:                | <b>Peak Search</b>   |
| Instrument S/W Revision: | Prior to A.02.00   |

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## 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                | <b>Front-panel key</b>  |
| 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"<br><br>This loads the state file data (on the default file directory path) into the instrument state. |
| Remote Command Notes    | See <a href="#">"Open" on page 384</a> .   |
| Key Path                | <b>Recall</b>  |
| 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 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

## Recall

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                | <b>Recall, State</b>  |
| 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                | <b>Recall, State</b>  |
| 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                | <b>Recall, State</b>  |
| 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                | <b>Recall, State</b>  |
| 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                | <b>Recall, State</b>  |
| 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                | <b>Recall, State</b>  |
| 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  |

## Recall

### From File\ File Open

Brings up the File Open standard Windows® dialog and its corresponding **File Open** key menu.

When you first enter this dialog, the State File default path is in the Look In: box in this File Open dialog. The File Open dialog is loaded with the file information related to the State Save Type. The first \*.state file is highlighted. The only files that are visible are the \*.state files and the Files of type is \*.state, since .state is the file suffix for the State Save Type. For more details, refer to “[File Open Dialog and Menu](#)” on [page 398](#).

|                         |   |
|-------------------------|---|
| Restriction and Notes   | Brings up Open dialog for recalling a State Save Type |
| Key Path                | <b>Recall, State</b>                                  |
| 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.

---

|             |   |
|-------------|---|
| <b>NOTE</b> | 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. |
|-------------|---|

---

|                          |   |
|--------------------------|---|
| <b>Remote Command:</b>   | :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.<br>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:                | <b>Recall, State, From File...</b>  |
| 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 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                 | MMEM:LOAD:TRAC TRACE2,"MyTraceFile.trace"<br><br>!This loads the trace file data (on the default file directory path) into the specified trace.<br><br>:MMEM:LOAD:TRAC:REG TRACE1,2<br><br>! restores the trace data in register 2 to Trace 1 |
| Key Path                | <b>Recall</b>   |
| Mode                    | SA  |
| Instrument S/W Revision | Prior to A.02.00  |

## Recall

### Register 1 thru Register 5

Selecting any one of these register keys causes the Traces and State from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified.

Trace registers are shared by all modes, so recalling from any one of the 5 registers may cause a mode switch to the mode that was active when the save to the Register occurred.

After the recall completes, the message “Trace Register <register number> recalled” appears in the message bar.

Selecting any one of these register menu keys: **Register 1, Register 2, Register 3, Register 4, Register 5** causes the traces and state of the mode from the specified Register to be recalled. The registers are provided for easy saving and recalling, since you 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                | <b>Recall, Trace</b>  |
| 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                | <b>Recall, Trace</b>  |
| 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                | <b>Recall, Trace</b>  |
| 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                | <b>Recall, Trace</b>  |
| 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                | <b>Recall, Trace</b>  |

|                         |   |
|-------------------------|---|
| 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                | <b>Save, Data, Trace</b> |
| 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 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 398.

|                         |   |
|-------------------------|---|
| Restriction and Notes   | Brings up Open dialog for recalling a Trace Save Type |
| Key Path                | <b>Recall, Trace</b>                                  |
| 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.

## Recall

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 384](#) for details.

|                         |  |
|-------------------------|--|
| Restriction and Notes   | Auto return to the Trace menu and the Open dialog goes away.<br>Advisory Event "Recalled File <file name>" after recall is complete.   |
| <b>Remote Command</b>   | <code>:MMEMory:LOAD:TRACe</code><br><code>TRACE1   TRACE2   TRACE3   TRACE4   TRACE5   TRACE6, &lt;filename&gt;</code><br><br><code>:MMEMory:LOAD:TRACe:REGister</code><br><code>TRACE1   TRACE2   TRACE3   TRACE4   TRACE5   TRACE6, &lt;integer&gt;</code>   |
| Remote Command Notes    | Some modes and measurements do not have available all 6 traces. Phase Noise mode command, for example, is: <code>MMEMory:LOAD:TRACe</code><br><code>TRACE1 TRACE2 TRACE3,&lt;filename&gt;</code><br><br>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:<br><br>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.<br><br>If the trace file was saved using one the ALL enum, it is flagged as an "all traces" file. And all traces will be loaded. All of the traces are loaded with Update=Off to keep them from updating, regardless of the setting of "Recall State w/Trace Update". |
| Example                 | <code>:MMEM:LOAD:TRAC TRACE2,"myState.trace"</code><br>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.<br><br><code>:MMEM:LOAD:TRAC:REG TRACE1,2</code><br>restores the trace data in register 2 to Trace 1  |
| Key Path                | <b>Recall, Trace, Open...</b>  |
| 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 398](#) for more details.

|                         |   |
|-------------------------|---|
| Remote Command Notes    | No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:LOAD commands.                                |
| Key Path                | <b>Recall</b>   |
| 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<br>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.

## Recall

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"<br><br>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.<br><br>For SA measurements, traces cannot be recalled from a trace file that was saved with ALL traces selected. |
| Key Path                | <b>Recall, Data</b>  |
| 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<br>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                | <b>Recall, Data, Trace</b> |
| 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:<br>MMEM:LOAD:TRAC:DATA D1,"TRC1.TXT",TXT<br>!This command explicitly puts the data in the specified trace. |
|---------|--|

|                         |  |
|-------------------------|--|
| Key Path                | <b>Recall, Data (Import), Trace (to)</b> |
| Mode                    | VSA                                      |
| 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"<br>This loads the file of corrections data (on the default file directory path) into the specified correction table of date (2). |
|---------|---|

## Recall

|                         |  |
|-------------------------|--|
| 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.<br><br>When a correction is loaded from mass storage, it is automatically turned on. This also turns on the global “Apply Corrections” function.<br><br>Only the first correction array (Correction 1) supports antenna units.<br><br>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                | <b>Recall, Data</b>  |
| Mode                    | SA EDGE GSM  |
| Preset                  | 1<br><br>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 398](#) 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                | <b>Recall, Data, Amplitude Correction</b> |
| Mode                    | SA EDGE GSM                               |
| Readback                | 1   |
| Instrument S/W Revision | A.02.00                                   |

|          |   |
|----------|---|
| Key Path | <b>Recall, Data, Amplitude Correction</b> |
| Mode     | SA EDGE GSM                               |



|                         |   |
|-------------------------|---|
| Readback                | 2   |
| Instrument S/W Revision | A.02.00                                   |
| Key Path                | <b>Recall, Data, Amplitude Correction</b> |
| Mode                    | SA EDGE GSM                               |
| Readback                | 3   |
| Instrument S/W Revision | A.02.00                                   |
| Key Path                | <b>Recall, Data, Amplitude Correction</b> |
| 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 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               | <b>Recall, Data</b>  |
| 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  |

## Recall

|                         |                       |
|-------------------------|-----------------------|
| 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                | <b>Recall, Data, Limit Line</b> |
| 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"<br>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                | <b>Recall, Data</b>  |
| 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"<br>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                | <b>Recall, Data</b>  |
| 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                | <b>Recall, Data (Import)</b>   |
| Mode                    | VSA  |
| Notes                   | Available file types are: <ul style="list-style-type: none"> <li>• CSV (Comma delimited) (*.csv)</li> <li>• MAT-File (*.mat)</li> <li>• MAT-File (Version 4) (*.mat)</li> <li>• MAT-File (HDF5) (*.mat;*.hdf;*.h5)</li> <li>• N5110A Waveform (*.bin)</li> <li>• SDF (Fast) (*.sdf;*.dat)</li> <li>• SDF (Export) (*.sdf;*.dat)</li> <li>• Text (Tab delimited) (*.txt)</li> </ul> |
| 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                | <b>Recall, Data</b>   |
| Instrument S/W Revision | Prior to A.02.00  |

## Recall

### 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.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | <code>:MMEMory:LOAD:TRACe:DATA<br/>TRACE1   TRACE2   TRACE3   TRACE4   TRACE5   TRACE6, &lt;filename&gt;</code>   |
| Example                 | <code>:MMEM:LOAD:TRAC DATA TRACE2,"myTrace2.csv"</code> 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.<br><br>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  |
| <b>Remote Command</b>   | <code>:MMEMory:LOAD:TRACe:DATA<br/>D1   D2   D3   D4   D5   D6, &lt;filename&gt; [, CSV   TXT   SDF]</code>   |
| Example                 | <code>:MMEM:LOAD:TRAC:DATA D1,"TRC1.TXT",TXT</code>   |
| 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.

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 Sequential - aborts the current measurement  
Dependencies

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.

## Recall

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 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                | <b>Recall, &lt;various&gt;, Open...</b>  |
| 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                | <b>Recall, &lt;various&gt;, Open...</b>        |
| 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                | <b>Recall, &lt;various&gt;, Open..., Sort</b>                          |
| 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                | <b>Recall, &lt;various&gt;, Open..., Sort</b>                          |
| Instrument S/W Revision | Prior to A.02.00   |

## Recall

### 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                | <b>Recall, &lt;various&gt;, Open..., Sort</b>                          |
| 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                | <b>Recall, &lt;various&gt;, Open..., Sort</b>                          |
| 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                | <b>Recall, &lt;various&gt;, Open..., Sort</b>                          |
| 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                | <b>Recall, &lt;various&gt;, Open..., Sort</b>                          |
| 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.

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                | <b>Recall, &lt;various&gt;, Open...</b>  |
| 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                | <b>Recall, &lt;various&gt;, Open...</b>  |
| Instrument S/W Revision | Prior to A.02.00   |

## Recall

### 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                | <b>Recall, &lt;various&gt;, Open...</b>                              |
| Instrument S/W Revision | Prior to A.02.00   |

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## 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

|                                       |  |
|---------------------------------------|--|
| <b>Remote Command:</b>                | :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<br>:INITiate:IMMEDIATE<br>Either of the above commands perform exactly the same function.  |
| SCPI Status Bits/OPC<br>Dependencies: | This is an Overlapped command.<br>The STATUS:OPERATION register bits 0 through 8 are cleared.<br>The STATUS:QUESTIONABLE register bit 9 (INTEGRITY sum) is cleared.<br>The SWEEPING bit is set.<br>The MEASURING bit is set. |
| Instrument S/W Revision:              | Prior to A.02.00   |

|                         |  |
|-------------------------|--|
| <b>Remote Command:</b>  | :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<br>:INITiate:IMMEDIATE<br>Either of the above commands perform exactly the same function.  |

## Restart

|                                    |  |
|------------------------------------|--|
| SCPI Status Bits/OPC Dependencies: | This is an Overlapped command.<br>The STATUS:OPERation register bits 0 through 8 are cleared.<br>The STATUS:QUESTionable register bit 9 (INTEgrity sum) is cleared.<br>The SWEEPING bit is set.<br>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

Accesses a menu that provides the save type options. The Analog Demod measurements will support the following:

Save and Recall of state only.

Save of measurement results

The Analog Demod measurements will NOT support save or recall of trace+state.

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

## Export/ImportData

The Analog Demod Mode Export Data options include Traces and Measurement Results.

|                          |   |
|--------------------------|---|
| Remote Command Notes:    | No SCPI command directly controls the Data Type that this key controls. The Data Type is included as part of the MMEM:STORe commands. |
| Preset:                  | Trace; is not affected by a Preset, but is reset during Restore Mode Defaults and survives Power cycles.                              |
| State Saved:             | Saved in instrument state.  |
| Instrument S/W Revision: | Prior to A.02.00  |
| Key Path:                | <b>Save, Data</b>   |

## Trace

Selects Trace as the data type to be exported with this save request. This key brings up the Trace menu that enables you to select one of the following traces:

- RF Spectrum(RFSpectrum)
- Demod(DEMod)
- Demod Avg(DAVerage)
- Demod Max(DMAXimum)
- Demod Min(DMINimum)
- AF Spectrum(AFSpectrum)

Once you select a trace, the menu returns back to the Data menu and the name of the selected trace is annotated on the Trace key. Now that you have selected exactly what needs to be saved, to trigger a save of the selected trace, you must select the **Save As** key in the Data menu.

If the Demod Min trace, Demod Max trace, or Demod Avg trace is exported when the Average/Hold feature is turned off, the resulting data will be default values.

## Save

The trace data file is a .csv file containing the data for one trace, suitable for import into spreadsheet software. There is a header block, followed by metadata that includes the parameters necessary to recreate the measurement, followed by a DATA block that contains the x,y data for the specified trace. Each line in the metadata includes the parameter, followed by a comma, followed by the parameter value. The metadata includes the following information:

### Parameter

|                      |   |
|----------------------|---|
| Measurement †        | AM FM PM  |
| Trace                | AF Spectrum RF Spectrum Demod <br>Demod Ave Demod Min Demod Max |
| X Axis Unit          | Hz S  |
| Y Axis Unit          | dBm % Hz Rad  |
| Center Frequency †   | [units of Hz]   |
| Channel BW †         | [units of Hz]   |
| Average State †      | Off On  |
| Average Count        | #   |
| HPF/BPF †            | Off HPF20 HPF50 HPF300 CCITT                                    |
| LPF †                | Off LPF300 LPF3K LPF15K LPF30K LPF80K LPF300K                   |
| Attenuation †        | [units of dB]   |
| RF Coupling †        | AC DC   |
| Ref Level            | [units of Y Axis Unit]  |
| RF Span †            | [units of Hz]   |
| RF Res Bandwidth †   | [units of Hz]   |
| Sweep Time †         | [units of S]  |
| AF Start Freq        | [units of Hz]   |
| AF Stop Freq †       | [units of Hz]   |
| AF Res Bandwidth †   | [units of Hz]   |
| Trigger Source †     | Off Ext1 Ext2   |
| Trigger Level †      | [units of V]  |
| Trigger Slope †      | Positive Negative   |
| Trigger Delay †      | [units of S]  |
| PreAmp State †       | Off On  |
| PreAmp Band †        | Low High  |
| Input Z Correction † | 50 75   |

**Parameter**

|               |                         |
|---------------|-------------------------|
| RF Calibrator | Off 50 MHz 4.8 GHz Comb |
| External Gain | [units of dB]           |

† Changing this parameter requires a measurement restart.

Note that all metadata is stored for each trace. After the metadata, the keyword DATA occurs on its own line, followed by the data (one X, Y pair per line)

|                         |  |
|-------------------------|--|
| Key Path                | <b>Save, Data</b>  |
| Preset                  | RF Spectrum; is not affected by a Preset, but is reset during Restore Mode Defaults and survives Power cycles. |
| State Saved             | Saved in instrument state.   |
| Instrument S/W Revision | Prior to A.02.00   |

**Measurement Results**

The file format of the .csv Measurement Results file is as follows:

**AM**

Carrier Power  
 Carrier Frequency Error (0)  
 Modulation Rate  
 SINAD value  
 Distortion/Total Voltage (rms)  
 Total Harmonic Distortion  
 Mod Depth (Peak+)  
 Mod Depth (Peak-)  
 Mod Depth (Pk-Pk)/2  
 Mod Depth (RMS)  
 Mod Depth (Peak+) Max Hold  
 Mod Depth (Peak-) Max Hold  
 Mod Depth (Pk-Pk)/2 Max Hold  
 Mod Depth (RMS) Max Hold

**FM and PM**

Carrier Power  
 Carrier Frequency Error  
 Modulation Rate  
 SINAD value  
 Distortion/Total Voltage (rms)  
 Total Harmonic Distortion  
 Deviation (Peak+)  
 Deviation (Peak-)  
 Deviation (Pk-Pk)/2  
 Deviation (RMS)  
 Deviation (Peak+) Max Hold  
 Deviation (Peak-) Max Hold  
 Deviation (Pk-Pk)/2 Max Hold  
 Deviation (RMS) Max Hold

|                         |                   |
|-------------------------|-------------------|
| Key Path                | <b>Save, Data</b> |
| Instrument S/W Revision | Prior to A.02.00  |

## Save

### Save As...

Accesses a menu that enables you to select the location where you can save the Data Type. 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 Data Type. The filename is filled in using the auto file naming algorithm for the specific Data Type and is highlighted. The “auto file name” feature automatically generates a file name for use when saving a file.

When you navigate to this selection, you have already determined that you are saving Data and now you want to specify to which file to direct the save.

When you first enter this dialog, the path in the Save In: field in this Save As dialog depends on which export data type you navigated here from. 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 Analog Demod Mode, 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:

My Documents\Analog Demod\data\traces

| Key Path                | Save, Data       |
|-------------------------|------------------|
| Instrument S/W Revision | Prior to A.02.00 |

### Save

When a Save of a specific Data File is requested, the 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 appear 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, time, and an advisory message that the file was saved appears in the message bar.

**Remote Command:** :MMEMory:STORe:TRACe:DATA  
RFSpectrum|DEMod|DAverage|DMaximum|DMinimum|AFSpectrum,  
<filename>

**Example:** :MMEM:STOR:TRAC:DATA RRSP, “myRFSpectrum.csv”  
exports the RF Spectrum trace to the file myRFSpectrum.csv in the default path.

**Remote Command Notes:** If the save is initiated through 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.

**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.

Remote Command Notes:

If the save is initiated through 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.

**Save**

---

## Source

There are no menus under this key in the Analog Demod mode.

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

## Source

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## SPAN X Scale

Activates and displays the Span function menu.

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

### Span

Adjusts the Span of the RF Spectrum window.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | [ :SENSE] :AM FM PM:FREQuency:SPAN <freq><br>[ :SENSe] :AM FM PM:FREQuency:SPAN?   |
| Example:                 | AM:FREQ:SPAN 2.122kHz<br>AM:FREQ:SPAN?   |
| Preset:                  | 75 kHz   |
| State Saved:             | Saved in State   |
| Min:                     | 10 Hz  |
| Max:                     | Max Span is the same as max information bandwidth. This is normally 10 MHz, or 25 MHz if the analyzer has the wide bandwidth option licensed |
| Key Path:                | <b>SPAN X Scale</b>  |
| Default Unit:            | Hz   |
| Instrument S/W Revision: | Prior to A.02.00   |

## SPAN X Scale

---

## Sweep/Control

Activates a menu and selects **Sweep Time** as the active function. Sweep time is used by the Demod Waveform window, but this key is available in any view.

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

### Demod Wfm Sweep Time

Selects the display length for the Demod Waveform window. This is commonly set to two sample lengths.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | [ :SENSE ] :AM   FM   PM :DWSweep :TIME <time><br>[ :SENSE ] :AM   FM   PM :DWSweep :TIME? |
| Example:                 | AM:DWS:TIME 50 ms<br>AM:DWS:TIME?  |
| Preset:                  | 2 ms   |
| State Saved:             | Saved in State   |
| Min:                     | 1 $\mu$ s  |
| Max:                     | 2 s  |
| Key Path:                | <b>Sweep/Control</b>   |
| Instrument S/W Revision: | Prior to A.02.00   |

### Demod Time

Selects the minimum length of data acquisition used in demodulation. Increasing the demod time will result in more accurate metrics; reducing the demod time will result in a faster measurement.

The measurement might require more data than specified by the demod time. If the resolution bandwidth is low in the spectrum windows, or the demod waveform sweep time is high, then the data required for the measurement might be higher than the demod time. If measurement speed is critical, make sure to increase the resolution bandwidth and reduce the demod waveform sweep time.

The Auto rules for demod time will give the nominal spec performance if the sweep time (above) is set to display two cycles of data.

|                        |  |
|------------------------|--|
| <b>Remote Command:</b> | [ :SENSE ] :AM   FM   PM :DEMMod :TIME <time><br>[ :SENSE ] :AM   FM   PM :DEMMod :TIME?<br>[ :SENSE ] :AM   FM   PM :DEMMod :TIME :AUTO OFF   ON   0   1<br>[ :SENSE ] :AM   FM   PM :DEMMod :TIME :AUTO? |
|------------------------|--|

## Sweep/Control

|                          |  |
|--------------------------|--|
| Example:                 | AM:DEM:TIME 50 ms<br>AM:DEM:TIME?  |
| Dependencies/Couplings:  | When in Auto mode, the demod time depends on the demod waveform sweep time.<br>Lower |
| Preset:                  | 72 ms<br>ON  |
| State Saved:             | Saved in State   |
| Min:                     | 1 $\mu$ s  |
| Max:                     | 44 s   |
| Key Path:                | <b>Sweep/Control</b>   |
| Instrument S/W Revision: | Prior to A.02.00   |



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## Trace/Detector

There are no menus under this key in the Analog Demod mode.

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



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## 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 421](#)

See [“RF Trigger Source” on page 423](#)

See [“I/Q Trigger Source” on page 424](#)

See [“More Information” on page 426](#)

### 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 “<a href="#">RF Trigger Source</a>” on page 423 and “<a href="#">I/Q Trigger Source</a>” on page 424 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                          | <b>Front-panel key</b>   |
| 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<br>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<br>WIMAX OFDMA: RFBurst<br>TD-SCDMA: BTS: External 1<br>MS: RFBurst | TD-SCDMA: BTS: External 1<br>MS: IQMag<br>Others: IMM | For TD-SCDMA:<br>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.<br><br>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,<br>TD-SCDMA  | SA, GSM:<br>RFBurst<br>TD-SCDMA:<br>EXTernal   | IMM  | TD-SCDMA doesn't support the Line and Periodic Timer parameters.<br><br>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,<br>C2K, WIMAX<br>OFDMA,<br>TD-SCDMA, 1xE<br>V-DO, DVB-T/H        | IMM  | IQ not supported   |  |
| SEM      | SA, WCDMA,<br>C2K, WIMAX<br>OFDMA,<br>TD-SCDMA,<br>1xEVDO,<br>DVB-T/H, DTMB | SA, WCDMA,<br>C2K,<br>TD-SCDMA,<br>WIMAX<br>OFDMA:<br>IMMediate<br>1xEVDO(BTS):<br>EXTernal1 | IQ not supported   |  |
| CDP      | WCDMA   | IMM  | IMM  |  |
| RHO      | WCDMA   | IMM  | IMM  |  |
| PCON     | WCDMA   | IMM  | IMM  |  |
| QPSK     | WCDMA, C2K,<br>1xEVDO   | All except<br>CDMA 1xEVDO:<br>IMMediate<br>CDMA 1xEVDO:<br>EXT1                              | IMM  |  |
| MON      | All except SA and<br>BASIC  | IMM  | IQ not supported   |  |
| WAV      |   | All except<br>GSM/EDGE:<br>IMMediate<br>GSM/EDGE:<br>RFBurst                                 | All except<br>GSM/EDGE:<br>IMMediate<br>GSM/EDGE:<br>IQMag |  |
| PVT      | WIMAX OFDMA   | RFB  | IMM  |  |
| EVM      | WIMAX<br>OFDMA,<br>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 &lt;measurement&gt; 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 <b>RF Trigger Source</b>, the following trigger sources are available:</p> <ul style="list-style-type: none"><li>— IMMEDIATE - free run triggering</li><li>— VIDEO - triggers on the video signal level</li><li>— LINE - triggers on the power line signal</li><li>— EXTERNAL1 - triggers on an externally connected trigger source on the rear panel</li><li>— EXTERNAL2 - triggers on an externally connected trigger source on the front panel</li><li>— RFBURST - triggers on the bursted frame</li><li>— FRAME - triggers on the periodic timer</li><li>— IF (video) - same as video, for backwards compatibility only</li><li>— ALARM – LXI Alarm</li><li>— LAN – LXI LAN event</li></ul> <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.

|                                    |   |
|------------------------------------|---|
| <b>Remote Command:</b>             | <pre>:TRIGger:&lt;measurement&gt;[:SEquence]:IQ:SOURce EXTernal1 EXTernal2 IMMEDIATE IQMag IDEMod QDEMod IINPut  QINPut AIQMag :TRIGger:&lt;measurement&gt;[:SEquence]:IQ:SOURce?</pre>   |
| Example:                           | <pre>TRIG:WAVEform:SOUR IQM</pre> <p>Selects I/Q magnitude triggering for the IQ Waveform measurement and the I/Q input</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 <b>I/Q Trigger Source</b>, the following trigger sources are available:</p> <ul style="list-style-type: none"> <li>— IMMEDIATE - free run triggering</li> <li>— EXTernal1 - triggers on an externally connected trigger source on the rear panel</li> <li>— EXTernal2 - triggers on an externally connected trigger source on the front panel</li> <li>— IQMag - triggers on the magnitude of the I/Q signal</li> <li>— IDEMod - triggers on the I/Q signal's demodulated I voltage</li> <li>— QDEMod - triggers on the I/Q signal's demodulated Q voltage</li> <li>— IINPut - triggers on the I channel's ADC voltage</li> <li>— QINPut - triggers on the Q channel's ADC voltage</li> <li>— AIQMag - triggers on the magnitude of the auxiliary receiver channel I/Q signal</li> </ul> <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  |

## Trigger

### More Information

The trigger menus let you select the trigger source and trigger settings for a sweep or measurement. In triggered operation (basically, any trigger source other than Free Run), the analyzer will begin a sweep or measurement only with the selected trigger conditions are met, generally when your trigger source signal meets the specified trigger level and polarity requirements. (In FFT measurements, the trigger controls when the data acquisition begins for FFT conversion.)

For each of the trigger sources, you may define a set of operational parameters or settings which will be applied when that source is selected as the current trigger source. Examples of these settings are Trigger Level, Trigger Delay, and Trigger Slope. You may apply different settings for each source; so, for example, you could have a Trigger Level of 1v for External 1 trigger and -10 dBm for Video trigger.

Once you have established the settings for a given trigger source, they generally will remain unchanged for that trigger source as you go from measurement to measurement within a Mode (although the settings do change as you go from Mode to Mode). Furthermore, the trigger settings within a Mode are the same 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.

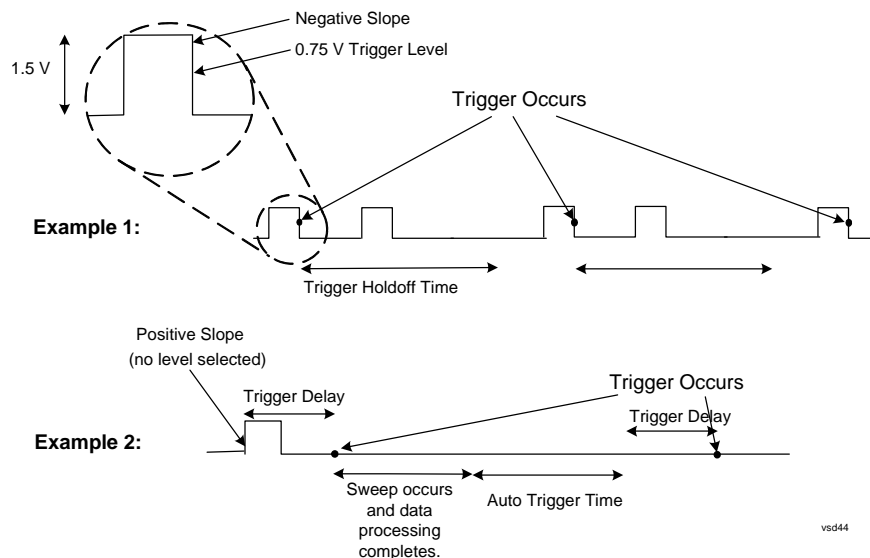
The settings setup menu can be accessed by pressing the key for the current trigger source a second time. For example, one press of Video selects the Video trigger as the source. The Video key becomes highlighted and the hollow arrow on the key turns black. Now a second press of the key takes you into 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:                          | <b>Trigger</b>   |                                  |
| 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:                          | <b>Trigger</b>   |                                  |
| Notes:                             | Log Plot and Spot Frequency measurements do not support Video Trigger  |                                  |
| SCPI Status Bits/OPC Dependencies: | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |                                  |

## Trigger

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.

**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

### Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

|                          |   |
|--------------------------|---|
| <b>Remote Command:</b>   | :TRIGger[:SEQuence]:LINE:SLOPe POSitive NEGative<br>:TRIGger[:SEQuence]:LINE:SLOPe? |
| Example:                 | TRIG:LINE:SLOP NEG  |
| Preset:                  | POSitive  |
| State Saved:             | Saved in instrument state.  |
| Key Path:                | <b>Trigger, Line</b>  |
| 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.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | :TRIGger[:SEQuence]:LINE:DELay <time><br>:TRIGger[:SEQuence]:LINE:DELay?<br>:TRIGger[:SEQuence]:LINE:DELay:STATe OFF ON 0 1<br>:TRIGger[:SEQuence]:LINE:DELay:STATe? |
| Example:                 | TRIG:LINE:DEL:STAT ON<br>TRIG:LINE:DEL 100 ms  |
| Preset:                  | Off, 1.000 us  |
| State Saved:             | Saved in instrument state.   |
| Min:                     | -150 ms  |
| Max:                     | 500 ms   |
| Key Path:                | <b>Trigger, Line</b>   |
| 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<br>TRIG:<meas>:SOUR EXT1 Measurements other than Swept SA  |
| State Saved:                       | Saved in instrument state.   |
| Key Path:                          | <b>Trigger</b>   |
| 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.

|                          |   |
|--------------------------|---|
| <b>Remote Command:</b>   | :TRIGger[:SEquence]:EXTernal1:LEVel <level><br>:TRIGger[:SEquence]:EXTernal1:LEVel?   |
| Example:                 | TRIG:EXT1:LEV 0.4 V   |
| Dependencies/Couplings:  | This same level is used for the Ext1 trigger source in the Trigger menu, for the Ext1 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext1 selection in the Gate Source menu. |
| Preset:                  | 1.2 V   |
| State Saved:             | Saved in instrument state.  |
| Min:                     | -5 V  |
| Max:                     | 5 V   |
| Key Path:                | <b>Trigger, External 1</b>  |
| 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.

|                        |   |
|------------------------|---|
| <b>Remote Command:</b> | :TRIGger[:SEquence]:EXTernal1:SLOPe POSitive NEGative<br>:TRIGger[:SEquence]:EXTernal1:SLOPe? |
| Example:               | TRIG:EXT1:SLOP NEG  |

## Trigger

|                          |  |
|--------------------------|--|
| 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:                | <b>Trigger, External 1</b>   |
| 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.

|                        |  |
|------------------------|--|
| <b>Remote Command:</b> | <code>:TRIGger[:SEquence]:EXTernal1:DELay &lt;time&gt;</code><br><code>:TRIGger[:SEquence]:EXTernal1:DELay?</code><br><code>:TRIGger[:SEquence]:EXTernal1:DELay:STATe OFF ON 0 1</code><br><code>:TRIGger[:SEquence]:EXTernal1:DELay:STATe?</code> |
|------------------------|--|

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:                | <b>Trigger, External 1</b> |
| 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:     | <code>TRIG:SOUR EXT2</code> Swept SA measurement<br><code>TRIG:&lt;meas&gt;:SOUR EXT2</code> Measurements other than Swept SA |
| State Saved: | Saved in instrument state.  |



|                                    |  |
|------------------------------------|--|
| Key Path:                          | <b>Trigger</b>   |
| 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.

|                          |   |
|--------------------------|---|
| <b>Remote Command:</b>   | :TRIGger[:SEquence]:EXTernal2:LEVel<br>: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:                | <b>Trigger, External 2</b>  |
| 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.

|                         |  |
|-------------------------|--|
| <b>Remote Command:</b>  | :TRIGger[:SEquence]:EXTernal2:SLOPe POSitive NEGative<br>: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   |

## Trigger

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)

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.

## Trigger

|                          |  |
|--------------------------|--|
| Preset:                  | Absolute: -20 dBm<br>Relative: -6 dB<br>GSM: -25 dB<br>ABSolute              |
| State Saved:             | Saved in instrument state.   |
| Min:                     | Absolute: -200 dBm<br>Relative: -45 dB                                       |
| Max:                     | Absolute: 100 dBm<br>Relative: 0 dB  |
| Key Path:                | <b>Trigger, RF Burst</b>   |
| Default Unit:            | Absolute: depends on the current selected Y-Axis unit<br>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.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | :TRIGger[:SEquence]:RFBurst:SLOPe POSitive NEGative<br>: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:                | <b>Trigger, RF Burst</b>   |
| 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.

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.

## Trigger

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**.

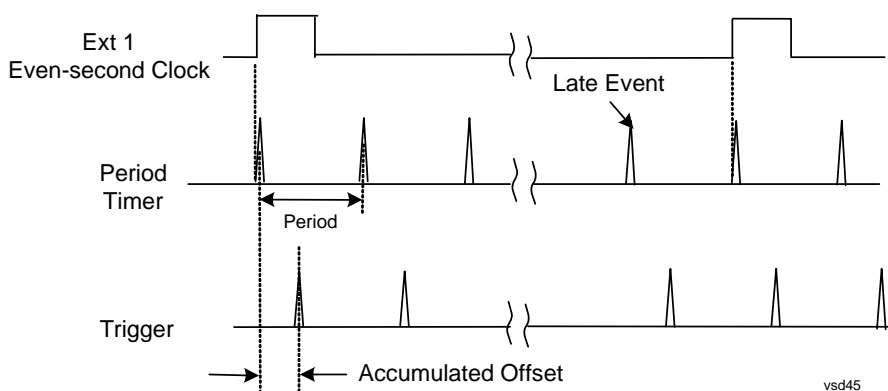
The figure below shows the action of the periodic timer trigger. Before reviewing the figure, we'll explain some uses for the periodic trigger.

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

## Trigger

### 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, 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.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | <code>:TRIGger[:SEquence]:FRAMe:OFFSet &lt;time&gt;</code><br><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.<br><br>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.<br><br>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:                | <b>Trigger, Periodic Timer</b>   |
| 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.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | :TRIGger [:SEQuence] :FRAMe:ADJust <time>  |
| Example:                 | TRIG:FRAM:ADJ 1.2 ms   |
| Dependencies/Couplings:  | The invalid data indicator turns on when the offset is changed, until the next sweep/measurement completes.<br><br>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.<br><br>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.<br><br>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.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | :TRIGger [:SEQuence] :FRAMe:OFFSet:DISPlay:RESet |
| Example:                 | TRIG:FRAM:OFFS:DISP:RES                          |
| Key Path:                | <b>Trigger, Periodic Timer</b>                   |
| 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.

## Trigger

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 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:                | <b>Trigger, Periodic Timer, Sync Source</b> |
| 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:                | <b>Trigger, Periodic Timer, Sync Source</b> |
| 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.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | :TRIGger[:SEquence]:FRAMe:DELAy <time><br>:TRIGger[:SEquence]:FRAMe:DELAy?<br>:TRIGger[:SEquence]:FRAMe:DELAy:STATe OFF ON 0 1<br>:TRIGger[:SEquence]:FRAMe:DELAy:STATe? |
| Preset:                  | Off, 1.000 us  |
| State Saved:             | Saved in instrument state.   |
| Min:                     | -150 ms  |
| Max:                     | +500 ms  |
| Key Path:                | <b>Trigger, Periodic Timer</b>   |
| Default Unit:            | s  |
| Instrument S/W Revision: | Prior to A.02.00   |

## Trigger

### Sync Holdoff

Sync Holdoff specifies the duration that the sync source signal must be kept false before the transition to true to be recognized as the sync timing. The periodic timer phase is aligned when the sync source signal becomes true, after the Holdoff time is satisfied.

A holdoff of 2 ms will work with most WiMAX signals, but there may be cases where the burst off duration is less than 1 ms and this value will need to be changed.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | :TRIGger [:SEQuence] :FRAMe:SYNC:HOLDoff <time><br>:TRIGger [:SEQuence] :FRAMe:SYNC:HOLDoff?<br>:TRIGger [:SEQuence] :FRAMe:SYNC:HOLDoff:STATe OFF ON 0 1<br>: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:                | <b>Trigger, Periodic Timer</b>   |
| 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.

---

|             |   |
|-------------|---|
| <b>NOTE</b> | 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                | <b>Trigger</b>   |
| 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 444). 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<br>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                          | <b>Trigger, LXI Trigger</b>  |
| 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.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :TRIGger [:SEquence] :LXI:LAN:DISable:ALL |
| Example                 | :TRIG:LXI:LAN:DIS:ALL                     |
| Key Path                | <b>Trigger LXI Trigger, LAN Event</b>     |
| Mode                    | SA, IQ(Basic)                             |
| Instrument S/W Revision | Prior to A.02.00                          |

## Trigger

### 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.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | :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" |
| Key Path                | <b>Trigger LXI Trigger, LAN Event</b>  |
| 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.

|                       |  |
|-----------------------|--|
| <b>Remote Command</b> | :TRIGger [:SEquence] :LXI:LAN[:SET]:DETEction "LANEVENT", HIGH LOW RISE FALL           |
| Example               | :TRIG:LXI:LAN:DET "LAN0",HIGH  |
| Restriction and Notes | If a non existent LAN event is passed in the lanEvent argument, the command is ignored |
| Key Path              | <b>Trigger LXI Trigger, LAN Event, &lt;lanEvent&gt;</b>                                |
| 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   |
| <b>Remote Command</b>   | :TRIGger[:SEquence]:LXI:LAN[:SET]:DETEction? "LANEVENT"                                |
| Example                 | :TRIG:LXI:LAN:DET? "LAN0"?   |
| Restriction and Notes   | If a non-existent LAN event is passed in the lanEvent argument, the command is ignored |
| Key Path                | <b>Trigger LXI Trigger, LAN Event, &lt;lanEvent&gt;</b>                                |
| 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.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :TRIGger[:SEquence]:LXI:LAN[:SET]:DELay<br>"LANEVENT", <time> |
| Example                 | :TRIG:LXI:LAN:DEL "LAN0",5S                                   |
| Key Path                | <b>Trigger, LXI Trigger, LAN Event, &lt;lanEvent&gt;</b>      |
| 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  |
| <b>Remote Command</b>   | :TRIGger[:SEquence]:LXI:LAN[:SET]:DELay? "lanEvent"           |
| Example                 | :TRIG:LXI:LAN:DEL? "LAN0"                                     |
| Key Path                | <b>Trigger, LXI Trigger, LAN Event, &lt;lanEvent&gt;</b>      |
| Mode                    | SA, IQ(Basic)   |
| Preset                  | 0.0 s   |
| State Saved             | Saved in instrument state.                                    |

## Trigger

|                         |   |
|-------------------------|---|
| 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>**

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 Command 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.<br>Longer strings are concatenated to 16 characters and added.<br>No event is added if the LAN Event already exists.<br>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 Command 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.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | :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.<br>Longer strings are concatenated and the corresponding LAN Event is removed.<br>Nothing happens if the LAN event does not exist.<br>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 Command 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.

|                       |  |
|-----------------------|--|
| <b>Remote Command</b> | :TRIGger [:SEQuence] :LXI:LAN:REMove:ALL |
| Example               | :TRIG:LXI:LAN:REM:ALL                    |

## Trigger

|                         |   |
|-------------------------|---|
| 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 Command Only)

Only LXI Trigger LAN Events coming from hosts matching the filter string are processed. There is no front panel access to this command

The syntax for specifying a filter is as follows:

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

Specifying an empty string means that LXI trigger packets are accepted as a Trigger from any port on any host on the network via either TCP or UDP.

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

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

Examples:

"192.168.0.1:23"

"agilent.com, soco.agilent.com"

"agilent.com:80, 192.168.0.1"

**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 Command 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 Command 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.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | :TRIGger[:SEquence]:LXI:LAN[:SET]:IDENTifier<br>"LANEVENT", "identifier"<br><br>:TRIGger[:SEquence]:LXI:LAN[:SET]:IDENTifier?<br>"LANEVENT"  |
| Example                 | :TRIG:LXI:LAN:IDEN "LAN0","debugstring"  |
| Restriction and Notes   | The maximum length of the string is 16 characters.<br><br>Nothing happens if the LAN event does not exist.<br><br>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 Command Only)

Allows the configuration of some of the above parameters from a single SCPI command.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :TRIGger[:SEquence]:LXI:LAN[:SET]:CONFigure "lanEvent",<br><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 444). Pressing this key when it is already selected accesses the alarm source selection menu.

|         |                    |
|---------|--------------------|
| Example | TRIG:ACP:SOUR ALAR |
|---------|--------------------|

## 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. |
| Key Path                          | <b>Trigger LXI Trigger</b>   |
| 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)

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :TRIGger [:SEQuence] :LXI:ALARm:DISable:ALL |
| Example                 | :TRIG:LXI:ALAR:DIS:ALL                      |
| Key Path                | <b>Trigger, LXI Trigger, Alarm</b>          |
| Mode                    | SA, IQ(Basic)                               |
| Instrument S/W Revision | Prior to A.02.00                            |

### Alarm List

After selecting Alarm as the trigger source, you are presented with a list of possible alarms. Pressing an alarm (that is, "ALARM0") branches to the alarm setup menu.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | :TRIGger [:SEQuence] :LXI:ALARm:LIST?  |
| Example                 | :TRIG:LXI:ALAR:LIST?<br>Returns the complete list of Alarm events which is: "ALARM0" |
| Key Path                | <b>Trigger, LXI Trigger, Alarm</b>   |
| 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 \(Remote Command Only\)” on page 456](#).

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                | <b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;</b>   |
| 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   |
| <b>Remote Command</b>   | :TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue]:ABSolute "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                | <b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;,Time</b>  |
| Mode                    | SA, IQ(Basic)  |
| Preset                  | Current date at initialization at 00:00:00.000000  |

## Trigger

|                         |  |
|-------------------------|--|
| State Saved             | Saved in instrument state.   |
| Instrument S/W Revision | Prior to A.02.00   |
| <b>Remote Command</b>   | :TRIGger[:SEQuence]:LXI:ALARm[:SET]:TIME[:VALue]:ABSolu<br>te? "alarmEvent"  |
| Example                 | :TRIG:LXI:ALAR:TIME:ABS? "ALARM0"<br><br>This query returns data using the following format "YYYY/MM/DD<br>HH:MM:SS.SSSSSS" If the Absolute time has been changed from the front<br>panel, but has not been applied, the return value is of the form<br>"YYYY/MM/DD HH:MM:SS.SSSSSS (epoch time not set)".   |
| Remote Command Notes    | <date> is a representation of the date the alarm should occur in the form of<br>YYYY/MM/DD where:<br>YYYY is the four digit representation of year. (for example, 2007)<br>MM is the two digit representation of month. (for example. 01 to 12)<br>DD is the two digit representation of day. (for example, 01 to 28, 29, 30, or 31<br>depending on the month and year)<br><br><time> is a representation of the time of day the alarm should occur in the<br>form of HH:MM:SS.SSSSSS where:<br>HH is the two digit representation of the hour in 24 hour format<br>MM is the two digit representation of minute<br>SS.SSSSSS is a real representing seconds (for example 02.123456) |
| Key Path                | <b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;,Time</b>  |
| 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   |

### 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    | <b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;,Time</b> |
| 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 \(Remote Command Only\)”](#) on page 456), 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 synch.

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

## Trigger

### Epoch Time Value (Remote Command 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.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :TRIGger [:SEQuence] :LXI:ALARm [:SET] :TIME [:VALue]<br>"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)<br>FractionalSeconds: 0 |
| State Saved             | Saved in instrument state.  |
| Range                   | Seconds: Epoch time of current date at 00:00:00 (in TAI time) –<br>253402300800 + number of seconds local time zone offset from UTC<br>FractionalSeconds: 0.0 – 0.999999    |
| Instrument S/W Revision | Prior to A.02.00  |

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :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)<br>FractionalSeconds: 0 |
| State Saved             | Saved in instrument state.  |
| Range                   | Seconds: Epoch time of current date at 00:00:00 (in TAI time) –<br>253402300800 + number of seconds local time zone offset from UTC<br>FractionalSeconds: 0.0 – 0.999999    |
| Instrument S/W Revision | Prior to A.02.00  |

### Epoch Time Seconds (Remote Command Only)

Sets the seconds portion of the LXI Alarm time. This represents the number of seconds after January 1, 1970 00:00:00 (in TAI time) that the alarm should go off.

Values must be in the form of whole seconds; decimal values result in an error.

|                       |   |
|-----------------------|---|
| <b>Remote Command</b> | :TRIGger [:SEQuence] :LXI:ALARm [:SET] :TIME:SEConds<br>"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.<br>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:SECs? "alarmEvent "

|                         |  |
|-------------------------|--|
| Example                 | :TRIG:LXI:ALAR:TIME:SEC "ALARM0"?  |
| Restriction and Notes   | Values representing a time in the past result in an error.<br>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 Command 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   |

## Trigger

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :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 Command 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.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | :TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue]:RELati ve "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   |

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | :TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue]:RELati ve? "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.

|                       |  |
|-----------------------|--|
| <b>Remote Command</b> | :TRIGger[:SEquence]:LXI:ALARm[:SET]:PERiod "alarmEvent", <seconds> |
| Example               | :TRIG:LXI:ALAR:PER "ALARM0",1.2345 s                               |

|                         |  |
|-------------------------|--|
| Restriction and Notes   | A period of 0.0s effectively causes the trigger to occur only once, since all repetitions are fired simultaneously |
| Key Path                | <b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;</b>   |
| 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                | <b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;</b>   |
| 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                | <b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;</b> |
| 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"

## Trigger

|                         |  |
|-------------------------|--|
| Example                 | :TRIG:LXI:ALAR:REP "ALARM0",10                         |
| Key Path                | <b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;</b> |
| 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

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :TRIGger [:SEQuence] :LXI:ALARm[:SET] :ENABled<br>"alarmEvent",ON OFF 1 0 |
| Example                 | :TRIG:LXI:ALAR:ENAB "ALARM0",ON   |
| Key Path                | <b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;</b>                    |
| Mode                    | SA, IQ(Basic)   |
| Preset                  | OFF   |
| State Saved             | Saved in instrument state.  |
| Range                   | 1 0   |
| Instrument S/W Revision | Prior to A.02.00  |

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :TRIGger [:SEQuence] :LXI:ALARm[:SET] :ENABled?<br>"alarmEvent" |
| Example                 | :TRIG:LXI:ALAR:ENAB "ALARM0"?                                   |
| Key Path                | <b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;</b>          |
| 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 Command Only)**

Allows the configuration of some of the above parameters from a single SCPI command.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :TRIGger[:SEquence]:LXI:ALARm[:SET]:CONFigure<br>"alarmEvent", <enable>, <epochSeconds>, <epochFraction>,<br><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 Command Only)**

Returns the number of alarms in the LXI Trigger Alarm List.

|                          |   |
|--------------------------|---|
| <b>Remote Command:</b>   | :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.

|                         |   |
|-------------------------|---|
| <b>Key Path</b>         | <b>Trigger</b>  |
| 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                | <b>Trigger, Baseband I/Q</b> |
| Readback Text           | I/Q Mag                      |
| Instrument S/W Revision | Prior to A.02.00             |

## Trigger

### 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.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :TRIGger[:SEquence]:IQMag:LEVel <ampl ><br>:TRIGger[:SEquence]:IQMag:LEVel?   |
| Remote Command Notes    | The I/Q reference impedance is used for converting between power and voltage. |
| Example                 | TRIG:IQM:LEV -30 dBm  |
| Key Path                | <b>Trigger, Baseband I/Q, I/Q Mag</b>   |
| 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.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :TRIGger[:SEquence]:IQMag:SLOPe POSitive   NEGative<br>:TRIGger[:SEquence]:IQMag:SLOPe? |
| Example                 | TRIG:IQM:SLOP POS   |
| Key Path                | <b>Trigger, Baseband I/Q, I/Q Mag</b>   |
| 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.

|                       |  |
|-----------------------|--|
| <b>Remote Command</b> | :TRIGger[:SEquence]:IQMag:DELAy <time><br>:TRIGger[:SEquence]:IQMag:DELAy?<br>:TRIGger[:SEquence]:IQMag:DELAy:STATE OFF ON 0 1<br>:TRIGger[:SEquence]:IQMag:DELAy:STATE? |
|-----------------------|--|

|                         |  |
|-------------------------|--|
| Example                 | TRIG:IQM:DEL 10 ms<br>TRIG:IQM:DEL:STAT ON |
| Key Path                | <b>Trigger, Baseband I/Q, I/Q Mag</b>      |
| Preset                  | 1 us<br>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                | <b>Trigger, Baseband I/Q</b> |
| 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.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :TRIGger [:SEquence] :IDEMod:LEVel <voltage><br>:TRIGger [:SEquence] :IDEMod:LEVel? |
| Example                 | TRIG:IDEM:LEV 0.5 V   |
| Key Path                | <b>Trigger, Baseband I/Q, I (Demodulated)</b>                                       |
| 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  |

## Trigger

### Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | <code>:TRIGger[:SEquence]:IDEMod:SLOPe POSitive   NEGative</code><br><code>:TRIGger[:SEquence]:IDEMod:SLOPe?</code> |
| Example                 | <code>TRIG:IDEM:SLOP POS</code>   |
| Key Path                | <b>Trigger, Baseband I/Q, I (Demodulated)</b>   |
| 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.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | <code>:TRIGger[:SEquence]:IDEMod:DELay &lt;time&gt;</code><br><code>:TRIGger[:SEquence]:IDEMod:DELay?</code><br><code>:TRIGger[:SEquence]:IDEMod:DELay:STATE OFF ON 0 1</code><br><code>:TRIGger[:SEquence]:IDEMod:DELay:STATE?</code> |
| Example                 | <code>TRIG:IDEM:DEL 10 ms</code><br><code>TRIG:IDEM:DEL:STAT ON</code>   |
| Key Path                | <b>Trigger, Baseband I/Q, I (Demodulated)</b>  |
| Preset                  | 1 us<br>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       | <code>TRIG:&lt;meas&gt;:SOUR QDEM</code> |
| Key Path      | <b>Trigger, Baseband I/Q</b>             |
| 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.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :TRIGger[:SEquence]:QDEMod:LEVel <voltage><br>:TRIGger[:SEquence]:QDEMod:LEVel? |
| Example                 | TRIG:QDEM:LEV 0.5 V   |
| Key Path                | <b>Trigger, Baseband I/Q, Q (Demodulated)</b>                                   |
| 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.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :TRIGger[:SEquence]:QDEMod:SLOPe POSitive   NEGative<br>:TRIGger[:SEquence]:QDEMod:SLOPe? |
| Example                 | TRIG:QDEM:SLOP POS  |
| Key Path                | <b>Trigger, Baseband I/Q, Q (Demodulated)</b>   |
| 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.

|                       |  |
|-----------------------|--|
| <b>Remote Command</b> | :TRIGger[:SEquence]:QDEMod:DELaY <time><br>:TRIGger[:SEquence]:QDEMod:DELaY?<br>:TRIGger[:SEquence]:QDEMod:DELaY:STATe OFF ON 0 1<br>:TRIGger[:SEquence]:QDEMod:DELaY:STATe? |
|-----------------------|--|

## Trigger

|                         |   |
|-------------------------|---|
| Example                 | TRIG:QDEM:DEL 10 ms<br>TRIG:QDEM:DEL:STAT ON  |
| Key Path                | <b>Trigger, Baseband I/Q, Q (Demodulated)</b> |
| Preset                  | 1 us<br>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                | <b>Trigger, Baseband I/Q</b> |
| 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.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :TRIGger[:SEQuence]:IINPut:LEVel <voltage><br>:TRIGger[:SEQuence]:IINPut:LEVel? |
| Example                 | TRIG:IINP:LEV 0.5 V   |
| Key Path                | <b>Trigger, Baseband I/Q, Input I</b>   |
| 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.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :TRIGger[:SEQuence]:IINPut:SLOPe POSitive   NEGative<br>:TRIGger[:SEQuence]:IINPut:SLOPe? |
| Example                 | TRIG:IINP:SLOP POS  |
| Key Path                | <b>Trigger, Baseband I/Q, Input I</b>   |
| 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.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | :TRIGger[:SEQuence]:IINPut:DELay <time><br>:TRIGger[:SEQuence]:IINPut:DELay?<br>:TRIGger[:SEQuence]:IINPut:DELay:STATe OFF ON 0 1<br>:TRIGger[:SEQuence]:IINPut:DELay:STATe? |
| Example                 | TRIG:IINP:DEL 10 ms<br>TRIG:IINP:DEL:STAT ON   |
| Key Path                | <b>Trigger, Baseband I/Q, Input I</b>  |
| Preset                  | 1 us<br>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      | <b>Trigger, Baseband I/Q</b> |
| Readback Text | Input Q                      |

## Trigger

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.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :TRIGger[:SEquence]:QINPut:LEVel <voltage><br>:TRIGger[:SEquence]:QINPut:LEVel? |
| Example                 | TRIG:QINP:LEV 0.5 V   |
| Key Path                | <b>Trigger, Baseband I/Q, Input Q</b>   |
| 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.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :TRIGger[:SEquence]:QINPut:SLOPe POSitive   NEGative<br>:TRIGger[:SEquence]:QINPut:SLOPe? |
| Example                 | TRIG:QINP:SLOP POS  |
| Key Path                | <b>Trigger, Baseband I/Q, Input Q</b>   |
| 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.

|                       |  |
|-----------------------|--|
| <b>Remote Command</b> | :TRIGger[:SEquence]:QINPut:DELaY <time><br>:TRIGger[:SEquence]:QINPut:DELaY?<br>:TRIGger[:SEquence]:QINPut:DELaY:STATe OFF ON 0 1<br>:TRIGger[:SEquence]:QINPut:DELaY:STATe? |
|-----------------------|--|

|                         |  |
|-------------------------|--|
| Example                 | TRIG:QINP:DEL 10 ms<br>TRIG:QINP:DEL:STAT ON |
| Key Path                | <b>Trigger, Baseband I/Q, Input Q</b>        |
| Preset                  | 1 us<br>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                | <b>Trigger, Baseband I/Q</b> |
| 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.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :TRIGger [:SEquence] :AIQMag:LEVEl <ampl ><br>:TRIGger [:SEquence] :AIQMag:LEVEl? |
| Remote Command Notes    | The I/Q reference impedance is used for converting between power and voltage.     |
| Example                 | TRIG:AIQM:LEV -30 dBm   |
| Key Path                | <b>Trigger, Baseband I/Q, Aux Channel I/Q Mag</b>                                 |
| 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  |

## Trigger

### Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | <code>:TRIGger[:SEQuence]:AIQMag:SLOPe POSitive   NEGative</code><br><code>:TRIGger[:SEQuence]:AIQMag:SLOPe?</code> |
| Example                 | TRIG:AIQM:SLOP POS  |
| Key Path                | <b>Trigger, Baseband I/Q, Aux Channel I/Q Mag</b>   |
| 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.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | <code>:TRIGger[:SEQuence]:AIQMag:DELay &lt;time&gt;</code><br><code>:TRIGger[:SEQuence]:AIQMag:DELay?</code><br><code>:TRIGger[:SEQuence]:AIQMag:DELay:STATE OFF ON 0 1</code><br><code>:TRIGger[:SEQuence]:AIQMag:DELay:STATE?</code> |
| Example                 | TRIG:AIQM:DEL 10 ms<br>TRIG:AIQM:DEL:STAT ON   |
| Key Path                | <b>Trigger, Baseband I/Q, Aux Channel I/Q Mag</b>  |
| Preset                  | 1 us<br>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.

|                       |  |
|-----------------------|--|
| <b>Remote Command</b> | <code>:TRIGger[:SEQuence]:AIQMag:CENTer &lt;freq&gt;</code><br><code>:TRIGger[:SEQuence]:AIQMag:CENTer?</code> |
| Restriction and Notes | Trigger CF + 1/2 Trigger BW < Max<br>Trigger CF - 1/2 Trigger BW > Min   |

|                         |   |
|-------------------------|---|
| Example                 | :TRIG:AIQM:CENT 10 MHz                            |
| Key Path                | <b>Trigger, Baseband I/Q, Aux Channel I/Q Mag</b> |
| 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.

|                         |  |
|-------------------------|--|
| <b>Remote Command</b>   | :TRIGger [:SEquence] :AIQMag: BANDwidth <freq><br>: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.<br><br>The combination of Trigger Center Freq and Trigger BW is also limited:<br>Trigger CF + 1/2 Trigger BW < Max<br>Trigger CF – 1/2 Trigger BW > Min |
| Example                 | :TRIG:AIQM:BAND 8 MHz  |
| Key Path                | <b>Trigger, Baseband I/Q, Aux Channel I/Q Mag</b>  |
| Preset                  | Bandwidth option dependent:<br>No Opt: 10 MHz<br>Opt B25: 25 MHz<br>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                | <b>Trigger</b>   |
| Readback line           | Displays a summary of the Auto Trig and Holdoff settings, in square brackets<br>First line: Auto Off or Auto On<br>Second Line: "Hldf" followed by: <ul style="list-style-type: none"><li>• If Holdoff is Off, readback Off</li><li>• If Holdoff On and Type = Normal, readback value</li><li>• If Holdoff On and Type = Above, readback value followed by AL</li><li>• If Holdoff On and Type = Below, readback value followed by BL</li><li>• If Holdoff Type selection is not supported by the current measurement, Holdoff Type is always Normal</li></ul> |
| 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.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | :TRIGger[:SEquence]:ATRigger <time><br>:TRIGger[:SEquence]:ATRigger?<br>:TRIGger[:SEquence]:ATRigger:STATe OFF ON 0 1<br>:TRIGger[:SEquence]:ATRigger:STATe? |
| Example:                 | TRIG:ATR:STAT ON<br>TRIG:ATR 100 ms  |
| Preset:                  | Off, 100 ms  |
| State Saved:             | Saved in instrument state.   |
| Min:                     | 1 ms   |
| Max:                     | 100 s  |
| Key Path:                | <b>Trigger, Auto/Holdoff</b>   |
| 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.

## Trigger

### 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 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

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## View/Display

Each of the Analog Demod measurements (AM, FM, PM) has four views. The primary view is called “Quad View” and displays all four of these windows. This is the View seen after a Mode Preset (with the focus in the RF Spectrum window). There are also three other views that combine one of the graphics windows with the metrics windows. The views can be selected from the **View/Display** menu.

These views are designed such that you can identify analog modulated carriers, determine whether the carrier is a commercial or other broadcast station, and analyze the modulating signal.

|                         |   |
|-------------------------|---|
| Key Path                | <b>Front-panel key</b>  |
| <b>Remote Command</b>   | :DISPlay:AM FM PM:VIEW[:SElect]<br>QUAD RFSpectrum DEMod AFSpectrum<br><br>:DISPlay:AM FM PM:VIEW[:SElect]? |
| Example                 | :DISP:FM:VIEW DEM<br>selects Demod Waveform & Metrics View for FM Demod measurement                         |
| Preset                  | QUAD (Focus in RF Spectrum Window)  |
| State Saved             | Saved in instrument state.  |
| 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                | <b>View/Display</b> |
| Instrument S/W Revision | Prior to A.02.00    |

## Annotation

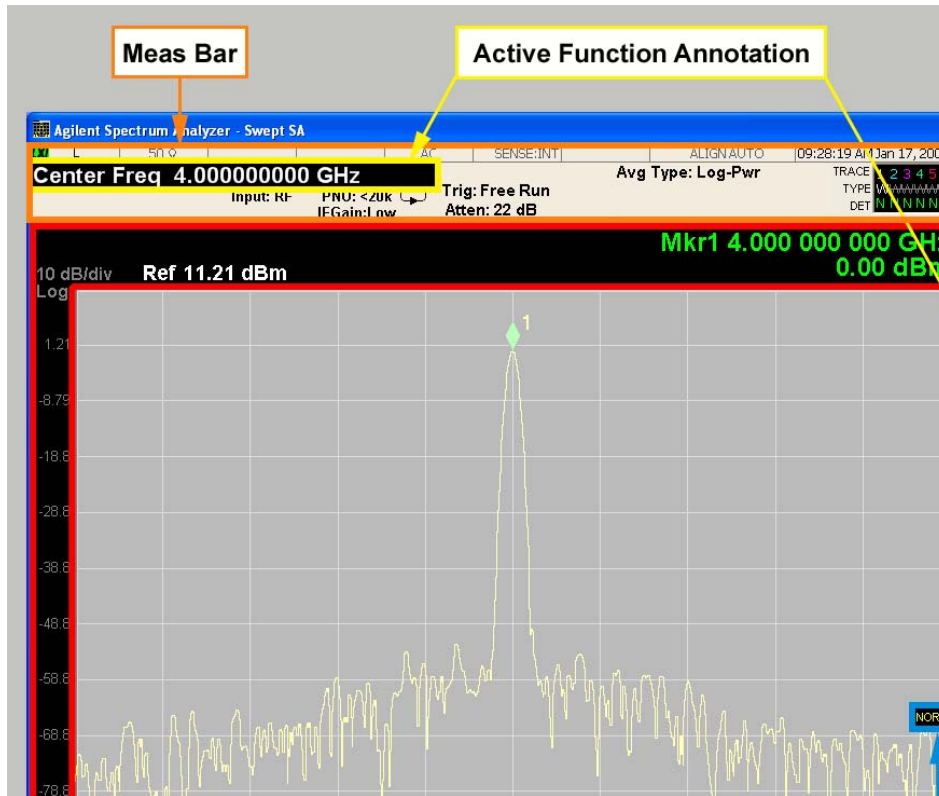
Turns on/off various parts of the display annotation. The annotation is divided up into four categories:

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

## View/Display

function values displayed on keys.

See figure below. Each type of annotation can be turned on and off individually.



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.

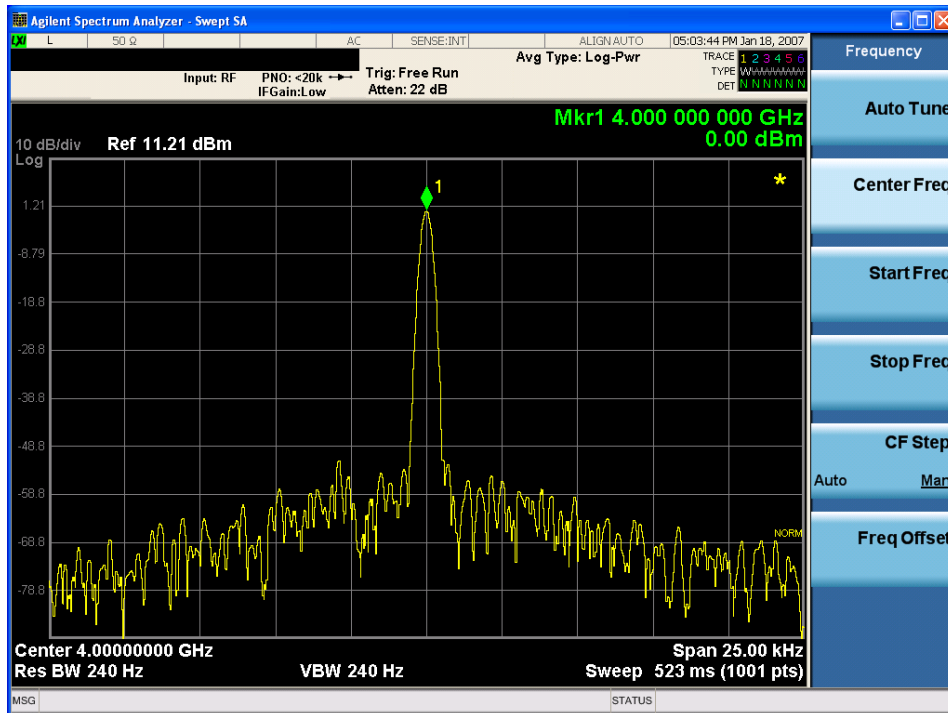
Key Path: **View/Display, Display, Annotation**  
 Instrument S/W Revision: Prior to A.02.00

### Active Function Values On/Off

Turns on/off the active function display in the Meas Bar, and all of the active function values displayed on the keys.

## View/Display

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.

---

|                         |   |
|-------------------------|---|
| <b>Remote Command</b>   | :DISPlay:<measurement>:ANNotation:TITLe:DATA <string><br>:DISPlay:<measurement>:ANNotation:TITLe:DATA?  |
| Example                 | DISP:ANN:TITL:DATA "This Is My Title"<br><br>This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used.<br><br>DISP:ACP:ANN:TITL:DATA "This Is My Title"<br><br>This example is for Measurements other than Swept SA.<br><br>Both set the title to: This Is My Title |
| Key Path                | <b>View/Display, Display, Title</b>   |
| 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.                   |
| Remote Command Notes: | Use the :DISPlay:ANNotation:TITLe:DATA <string> command with an empty string. |
| Preset:               | Performed on Preset.  |
| Key Path:             | <b>View/Display, Display, Title</b>   |

## View/Display

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 <ampl>  
: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:                | <b>View/Display, Display</b>                |
| 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                | <b>View/Display, Display, System Display Settings</b> |
| 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.

|                          |  |
|--------------------------|--|
| <b>Remote Command:</b>   | :DISPlay:WINDow[1]:ANNotation[:ALL] OFF ON 0 1<br>: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:                | <b>View/Display, Display, System Display Settings, Annotation</b>                      |
| 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 Page Setup and Save Screen Image. The four themes are detailed below.

|                        |   |
|------------------------|---|
| <b>Remote Command:</b> | :DISPlay:THEME TDColor TDMonochrome FCOLor FMONochrome<br>:DISPlay:THEME? |
| Preset:                | TDColor (Set by Restore Misc Defaults)                                    |

## View/Display

|                          |   |
|--------------------------|---|
| State Saved:             | Not saved in instrument state.  |
| Key Path:                | <b>View/Display, Display, System Display Settings</b>   |
| Remote Command Notes:    | TDColor – 3D is the standard color theme with filling and shading<br>TDMonochrome – is similar to 3D color, but only black is used<br>FCOLor – flat color is intended for inkjet printers to conserve ink. It uses a white background instead of black.<br>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.

|                          |   |
|--------------------------|---|
| <b>Remote Command:</b>   | :DISPlay:BACKlight ON OFF<br>:DISPlay:BACKlight?      |
| Preset:                  | ON (Set by Restore Misc Defaults)                     |
| Key Path:                | <b>View/Display, Display, System Display Settings</b> |
| Instrument S/W Revision: | Prior to A.02.00                                      |

**On**

Turns the display backlight on.

|                          |  |
|--------------------------|--|
| Example:                 | DISP:BACK ON   |
| Key Path:                | <b>View/Display, Display, System Display Settings, Backlight</b> |
| Readback:                | On   |
| Instrument S/W Revision: | Prior to A.02.00   |

**Off**

Turns the display backlight off.

|                          |  |
|--------------------------|--|
| Example:                 | DISP:BACK OFF  |
| Key Path:                | <b>View/Display, Display, System Display Settings, Backlight</b> |
| 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.

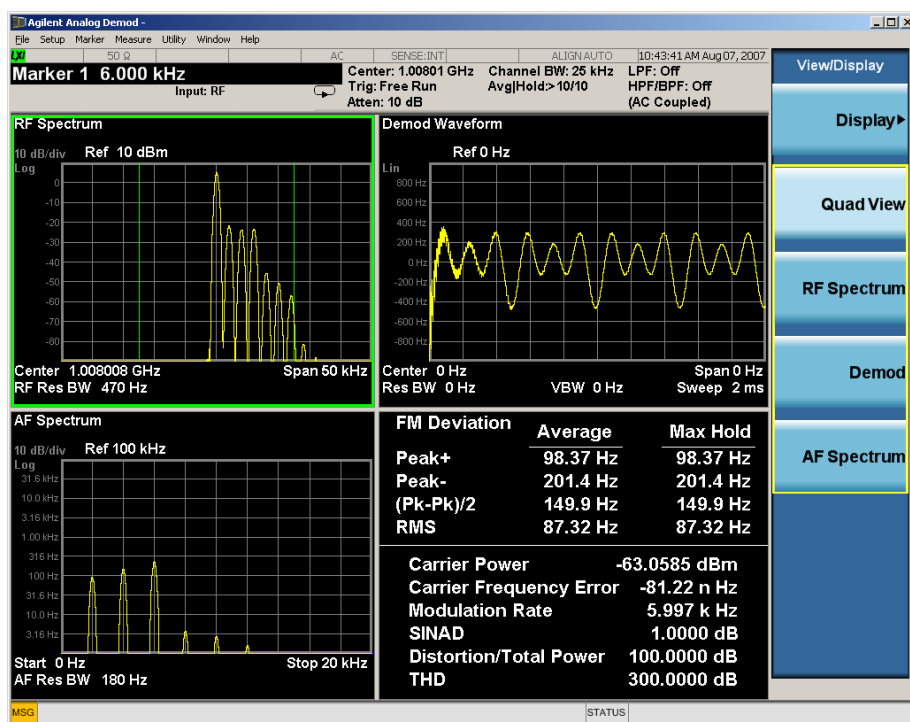
|                          |   |
|--------------------------|---|
| <b>Remote Command:</b>   | :DISPlay:BACKlight:INTensity <integer><br>:DISPlay:BACKlight:INTensity? |
| Example:                 | DISP:BACK:INT 50  |
| Preset:                  | 100 (Set by Restore Misc Defaults)                                      |
| Min:                     | 0   |
| Max:                     | 100   |
| Key Path:                | <b>View/Display, Display, System Display Settings</b>                   |
| Instrument S/W Revision: | Prior to A.02.00  |

## Quad View

The Quad View displays each of the four fundamental windows of the Analog Demod mode. The basic window format is essentially the same for the 3 measurements. The main difference is the demodulation technique performed in the hardware and the specific metrics and units of the displayed results.

In general, there is little window-context sensitivity in the Analog Demod mode, that is, most of the variables have been designed so that they are unique to their window. The three variables that are window dependent are, Ref Value, Scale/Div, and Ref Position. These variables change to reflect the settings of the current window (the current window is always outlined in green).

The Quad View is shown below. For more information on the views, see “RF Spectrum Window” on page 484, “Demod Waveform Window” on page 485. “AF Spectrum Window” on page 485, or “Metrics Window” on page 485.



## RF Spectrum Window

The **RF Spectrum** window shows a spectral display of the input RF signal with amplitude in the vertical Y axis and frequency in the horizontal X axis. The vertical axis is always scaled in dB, with units of dBm, with the Ref Value initially at the top of the vertical scale. This spectral display is basically identical to the Swept SA measurement’s frequency display; however it is always taken using an FFT. Its span is restricted to 8 MHz. Zero span is not allowed.

The **RF Spectrum** window provides a convenient way to identify broadcast stations by placing the signal of interest at the center frequency using this window and listening to the instrument’s speaker. Demodulation is always performed at the center frequency of the RF Spectrum window; this is regarded as the application’s center frequency and is annotated in the Measurement Bar.

In the RF Spectrum window, two green vertical lines are shown centered around the center frequency, with spacing equal to the Channel BW. If the Channel BW is wider than the span, they are not seen.

The Center Frequency, Span, and RF Res BW are annotated at the bottom of the RF Spectrum Window. The Ref Value and Scale/Div are annotated in their normal place above the graticule.

### Demod Waveform Window

In the **Demod Waveform** window, the demodulated signal is displayed in the time domain (zero span) with time on the horizontal X axis, and modulation depth (AM) or deviation (FM, PM) on the vertical Y axis.

In the **Demod Waveform** window the Y axis is linearly scaled in units of percent modulation for AM, frequency (Hz) for FM, or phase (radians) for PM. On a preset, the Ref Value is positioned in the center of the vertical scale.

Four traces are available in the Demod Waveform window. The Demod trace, in yellow, shows the current demodulation signal. The Demod Max trace, in cyan, shows the Max Hold value for each display point since the last restart and the Demod Min trace, in magenta, shows the Min Hold value for each display point since the last restart. The Demod Average trace, in green, shows the averaged demodulation signal. If Averaging is turned off, only the Demod trace is displayed.

The Sweep Time is annotated at the bottom of the Demod Waveform Window. The Ref Value and Scale/Div are annotated in their normal place above the graticule.

In PM, the phase displayed in the Analog Demod window is unwrapped, starting with the left most value. The unwrapping should be done based on the measured data, not based on the pixels.

### AF Spectrum Window

In the **AF Spectrum** window, the demodulated signal is displayed in the frequency domain with frequency on the X axis and amplitude on the Y axis.

The vertical axis is always scaled in dB with the Ref Value initially at the top of the vertical scale. The Y-Axis Unit is % for AM, Hz for FM, and radians for PM. In PM, the signal should be unwrapped before it is transformed.

In this view you can observe the spectral components of the modulating signal. The preset Start Frequency of this window is 0 Hz. The AF Start Freq and AF Stop Freq are annotated at the bottom of the AF Spectrum Window, as is the AF Res BW.

The Ref Value and Scale/Div are annotated in their normal place above the graticule.

### Metrics Window

The metrics window displays measurement results.. For each measurement, the metric of greatest typical interest is highlighted in yellow.

If averaging is turned on, the column marked “Current” is relabeled “Average” and the results in that column are averaged over successive measurements until the Average/Hold number is reached. Then, if not in Single, the measurement continues, exponentially averaging in successive results. The Max Hold column shows the Maximum value the unaveraged metric has attained since the last Restart. The Max Hold column is removed when averaging is turned off.

For dB units, display to .01 dB, unless averaging is on, then display to .001 dB. For linear units (W, V, A and ratios) display 4 digits. Always display all of the digits specified even if some are zero.

In linear pick the multiplier to be the largest power of 3 such that there is never a lone 0 to the left of the

## View/Display

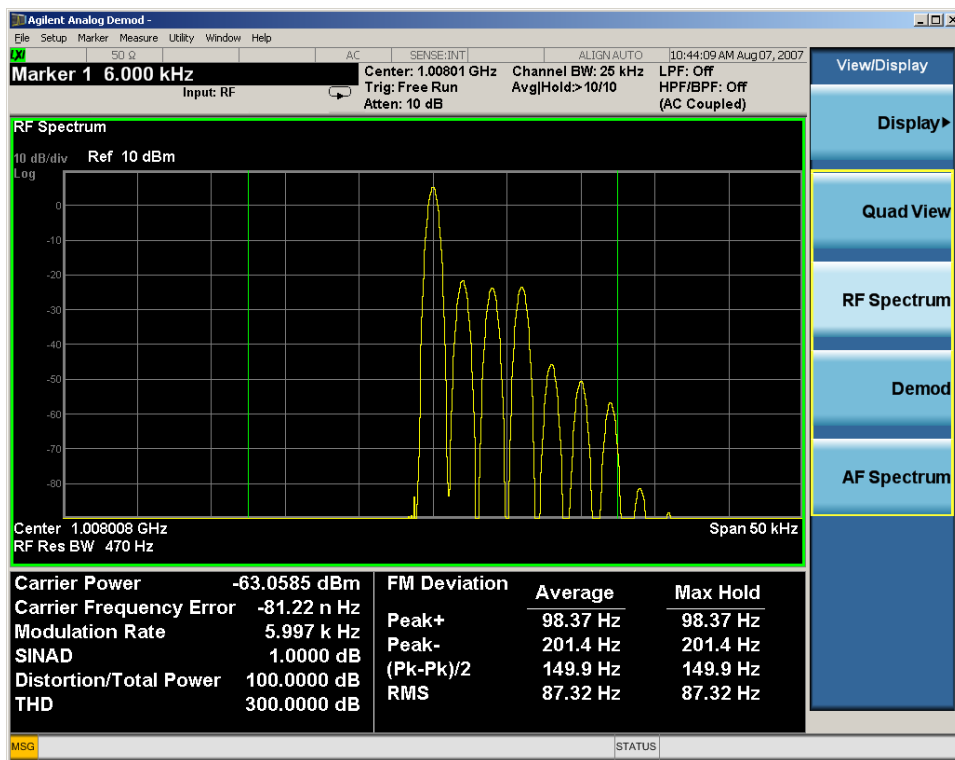
decimal point. Dimensionless quantities use engineering notation for multipliers, such as E+3. Note that E+0 is never displayed since it = 1.

The window title is “FM Deviation” in FM, “AM Mod Depth” in AM, and “PM Radians” in PM.

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

## RF Spectrum & Metrics View

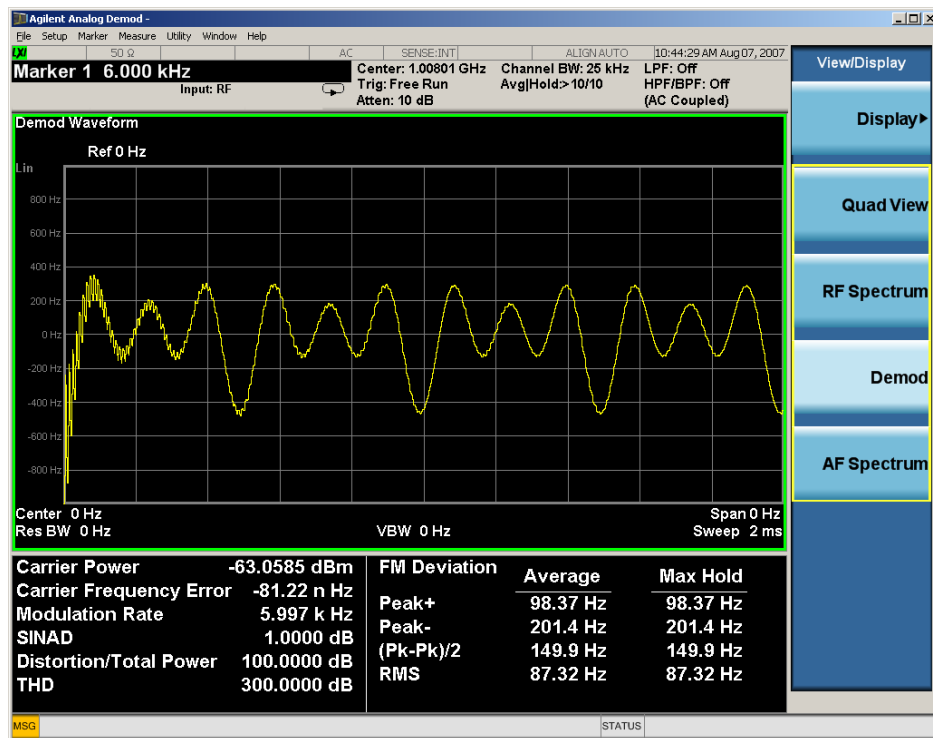
This view shows the RF Spectrum window and the Metrics window displayed in a split screen mode with the RF Spectrum window taking up approximately  $\frac{3}{4}$  of the display.



|                         |                     |
|-------------------------|---------------------|
| Key Path                | <b>View/Display</b> |
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## Demod Waveform & Metrics View

This view shows the Demod Waveform window and the Metrics windows displayed in a split screen mode with the Demod Waveform window taking up approximately  $\frac{3}{4}$  of the display.



Key Path

View/Display

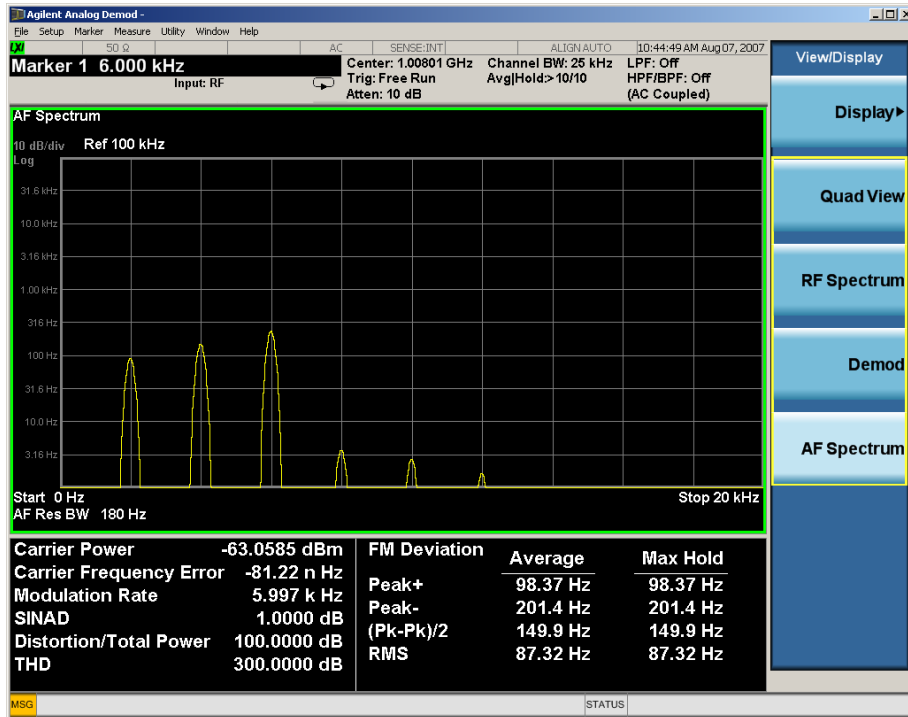
Instrument S/W Revision

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## View/Display

### AF Spectrum & Metrics View

This view shows the AF Spectrum window and the Metrics windows displayed in a split screen mode with the AF Spectrum window taking up approximately  $\frac{3}{4}$  of the display.



Key Path **View/Display**  
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### Distortion & THD Unit

Changes the units of distortion and THD in the Metrics screen between % and dB units.

**Remote Command:** `DISPlay:AM|FM|PM:VIEW:DISToRtion:UNIT DB|PCT`  
`DISPlay:AM|FM|PM:VIEW:DISToRtion:UNIT?`

Example: `DISP:AM:VIEW:DIST:UNIT PCT !` Sets AM distortion and THD display to percent.

Preset: PCT

State Saved: Saved in State

Key Path: **View/Display**

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## Metrics Settings

Accesses a menu used to control which metrics will be provided.

|                         |                     |
|-------------------------|---------------------|
| Key Path                | <b>View/Display</b> |
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## Modulation Magnitude

Controls which modulation magnitude metrics are provided. If speed is an issue, select the modulation magnitude metric that is required instead of using the default value of ALL. If modulation magnitude is set to anything but ALL, the other modulation magnitude metrics are loaded with NaN and shows “---“ in the metrics window.

|                          |   |
|--------------------------|---|
| <b>Remote Command:</b>   | DISPlay:AM FM PM:VIEW:METRic:MMAGnitude<br>ALL PPK PNPK RMS<br><br>DISPlay:AM FM PM:VIEW:METRic:MMAG? |
| Example:                 | DISP:AM:VIEW:METR:MMAG PPK!Sets AM modulation magnitude to peak +.                                    |
| Preset:                  | ALL   |
| State Saved:             | Saved in State  |
| Key Path:                | <b>View/Display, Metrics Settings</b>   |
| Instrument S/W Revision: | Prior to A.02.00  |

## ALL

Turns on all modulation magnitude metrics. In the metrics window, Peak +, Peak -, Pk-Pk/2 and RMS results are provided.

|                         |  |
|-------------------------|--|
| Key Path                | <b>View/Display, Metrics Settings, Mod Magnitude</b> |
| Example                 | DISP:AM:VIEW:METR:MMAG ALL                           |
| Instrument S/W Revision | Prior to A.02.00                                     |

## Peak+ Only

Turns on just the Peak+ metric in the portion of the metrics window that shows the modulation magnitude results.

|                         |  |
|-------------------------|--|
| Key Path                | <b>View/Display, Metrics Settings, Mod Magnitude</b> |
| Example                 | DISP:AM:VIEW:METR:MMAG PPK                           |
| Instrument S/W Revision | Prior to A.02.00                                     |

## View/Display

### Pk-Pk/2 Only

Turns on just the Pk-Pk/2 metric in the portion of the metrics window that shows the modulation magnitude results. .

Example: `DISP:AM:VIEW:METR:MMAG PNPk`  
Key Path: **View/Display, Metrics Settings, Mod Magnitude**  
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### RMS Only

Turns on just the RMS metric in the portion of the metrics window that shows the modulation magnitude results.

Example: `DISP:AM:VIEW:METR:MMAG RMS`  
Key Path: **View/Display, Metrics Settings, Mod Magnitude**  
Instrument S/W Revision: Prior to A.02.00

### Modulation Rate

Toggles the Modulation Rate metric. When turned On, the Modulation Rate metric is provided. When turned Off, the Modulation Rate metric is set to NaN and shows “---“ in the metric window.

**Remote Command:** `DISPlay:AM|FM|PM:VIEW:METRics:MRATe[:STATe] ON|OFF|1|0`  
`DISPlay:AM|FM|PM:VIEW:METRics:MRAT?`  
Example: `DISP:AM:VIEW:METRics:MRAT OFF` !Sets AM modulation rate to off  
Preset: On  
State Saved: Saved in State  
Key Path: **View/Display, Metrics Settings**  
Instrument S/W Revision: Prior to A.02.00

### SINAD, THD, Distortion

Toggles the distortion metrics – SINAD, Distortion. When turned on, the Modulation Rate is the only metric provided. When turned off, SINAD, Distortion and THD metrics are set to NaN and show “---“ in the metric window.

SINAD is the ratio of total received power (the received signal-plus-noise-plus-distortion power) to the received noise-plus-distortion power. It is always expressed in decibel units. The rejection of the carrier from the noise-plus-distortion power measurement is usually not much more than 50 dB, thus limiting the maximum SINAD.

THD is the ratio of the root mean square voltage of the harmonics referenced to the fundamental voltage, expressed in % or dB. Note the differences with respect to Distortion. The denominator of the ratio is different and the items in the numerator do not include the noise between harmonics, just the harmonics themselves.

Distortion/Total Voltage (rms) is the ratio of unwanted received power (noise plus distortion) to the total received power, expressed in % or dB. Therefore, this metric is the negative of SINAD when expressed in decibels.

|                          |   |
|--------------------------|---|
| <b>Remote Command:</b>   | DISPlay:AM FM PM:VIEW:METRics:MRATe[:STATe] ON OFF 1 0<br>DISPlay:AM FM PM:VIEW:METRics:MRAT? |
| Example:                 | DISP:AM:VIEW:METRics:MRAT OFF !Sets AM modulation rate to off                                 |
| Preset:                  | On  |
| State Saved:             | Saved in State  |
| Key Path:                | <b>View/Display, Metrics Settings</b>   |
| Instrument S/W Revision: | Prior to A.02.00  |

