Keysight X-Series Signal Analyzers

This manual provides documentation for the following Analyzers:

MXA Signal Analyzer N9020A
EXA Signal Analyzer N9010A

Notice: This document contains references to Agilent. Please note that Agilent's Test and Measurement business has become Keysight Technologies. For more information, go to www.keysight.com.

N9073A XFP Combined W-CDMA Measurement Application: User's and Programmer's Reference

KEYSIGHT TECHNOLOGIES

Notices

Trademark Acknowledgements

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1400 Fountaingrove Parkway
Santa Rosa, CA 95403

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Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

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Where to Find the Latest Information

Documentation is updated periodically. For the latest information about these products, including instrument software upgrades, application information, and product information, browse to one of the following URLs, according to the name of your product:

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

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

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

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

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

To receive the latest updates by email, subscribe to Keysight Email Updates at the following URL:

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

Information on preventing analyzer damage can be found at:

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

Is your product software up-to-date?

Periodically, Keysight releases software updates to fix known defects and incorporate product enhancements. To search for software updates for your product, go to the Keysight Technical Support website at:

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

Table of Contents

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List of Commands

This list includes every SCPI command described in this document. To find a command in the list, search according to its first alphanumeric character, ignoring any leading ":" or "[" characters. However, IEEE 488.2 Common Commands, which start with “*”, all appear at the start of the list.

1 Locating Other Documentation

The measurements described in this manual do not have embedded Help functionality, but you can access supporting documentation from several sources:

- **Hard Disk**. Frequently-used documentation is present on the instrument's hard disk, either as HTML Help or Acrobat PDF files. To locate these files, see "Locating On-disk Documentation" on page 30 below.

  In addition to the interactive Windows (HTML) Help system files for most measurement applications, the instrument's hard disk contains Application Notes, tutorial documents, etc.

- **Documentation DVD**. The same documentation set is also included on the Documentation DVD shipped with your instrument.

- **Web Site**. All available documentation may be downloaded from the Keysight web site. Browse to one of the following URLs, according to the name of your product:

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

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

Locating On-disk Documentation

Help File Links to Manuals

The easiest way to access on-disk manuals is via the hyperlinks in the "Additional Documentation" section of the Help (CHM) for any measurement application.

To open Help, select the desired measurement application via the instrument's **Mode** key, then press the green **Help** key on the front panel, as shown below. The Help window opens in the main screen.

With Help open, locate the "Additional Documentation" section via the Help Contents pane, then scroll down to find the link to the manual of interest. Clicking the hyperlink opens the specified manual.

Disk Directory Structure

To navigate the instrument's directory structure effectively, you will need to connect a PC mouse and keyboard to the instrument, via any of the USB ports.

To display the Windows task bar, move the cursor to the lower edge of the screen.

Documents are grouped in subdirectories of the disk's C: partition, as follows:

Directory Path	Content
C:\Program Files\Keysight\SignalAnalysis\Infrastructure\Help	HTML Help (CHM) files for most X-Series Measurement Applications
C:\Program Files\Keysight\SignalAnalysis\Infrastructure\Help\bookfiles	PDF versions of the Keysight X-Series Signal Analyzer: Getting Started Guide and the X-Series Instrument Messages Guide.

Many 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 31.

Navigating Acrobat (PDF) Files

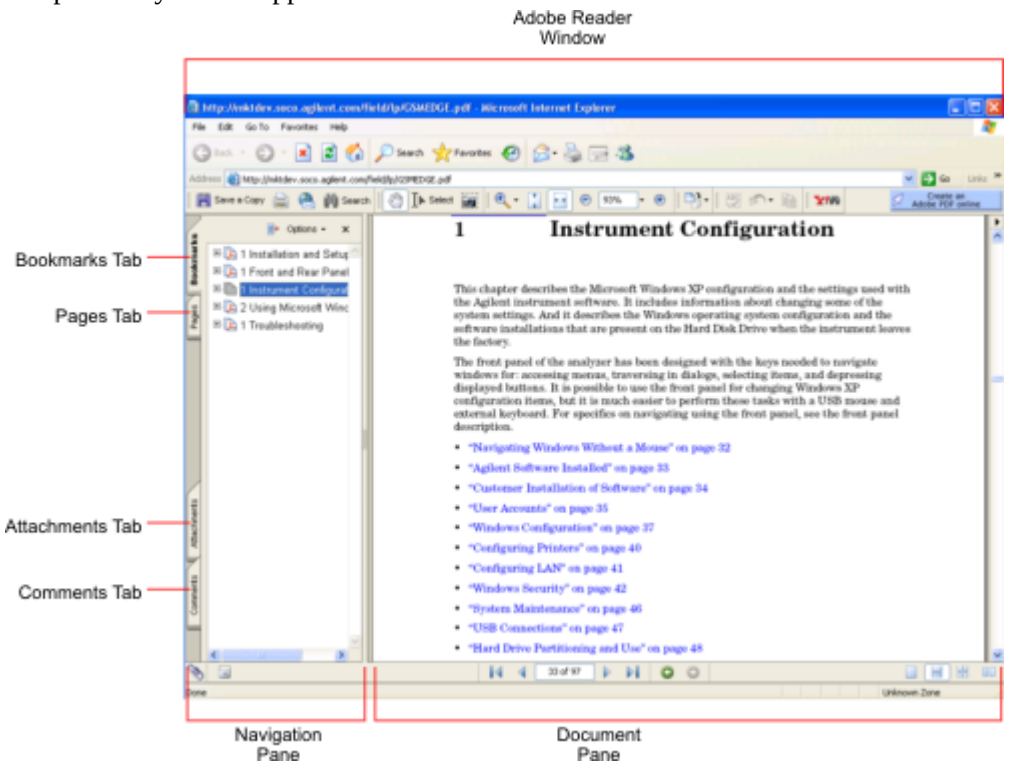
IMPORTANT To navigate PDF files effectively, you must attach a mouse and keyboard to the instrument.

If it is not possible to attach a mouse and keyboard to the instrument, you should copy the PDF file to a separate computer, then open it on that computer. Every PDF file that is present on the instrument's hard disk can also be found on the Documentation DVD shipped with the instrument. For details, see "Copying the Acrobat (PDF) Files" on page 35.

Adobe Reader Window

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

Note that, unlike the HTML Help Window, the Acrobat Reader Window is **not** embedded in the instrument'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 X-Series instruments contain useful content only under the Bookmarks and Pages Tabs: the Attachments and Comments Tabs are not used.

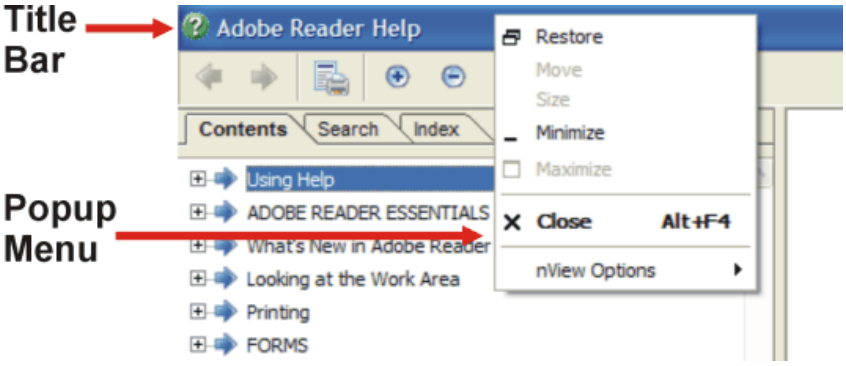
Navigating the Acrobat Reader Window

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 instrument's hard disk before any file can be printed.

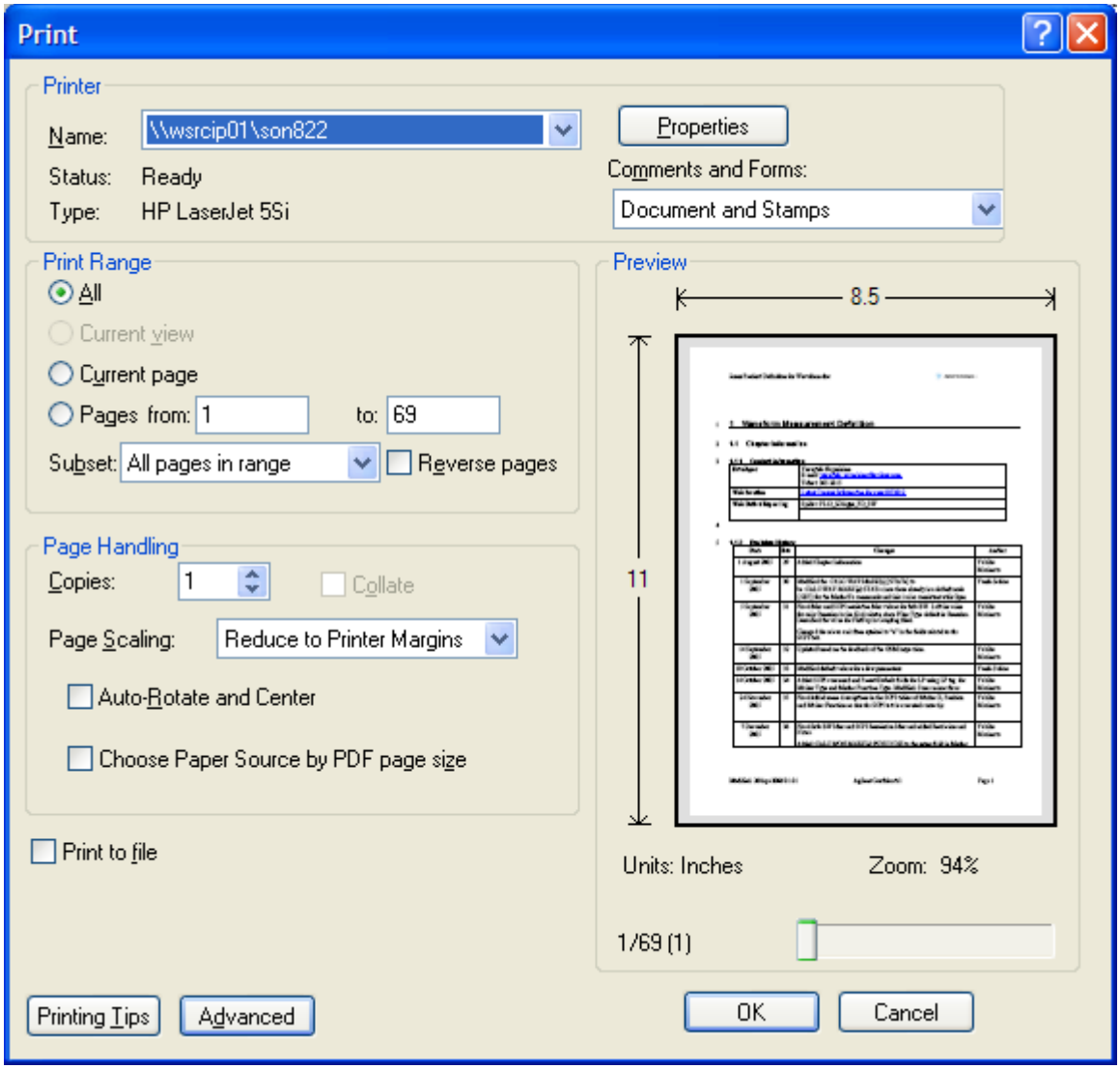
To print all or part of an open Acrobat file, do the following.

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

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

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



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

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

Viewing Documentation on a Separate Computer

You may want to view help or other documents **without** having them appear on top of the instrument's screen.

For most instrument Modes or Measurement Applications, the same help information exists in two separate files, 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 files to another computer, then open and view the pages in the file on that computer.

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

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

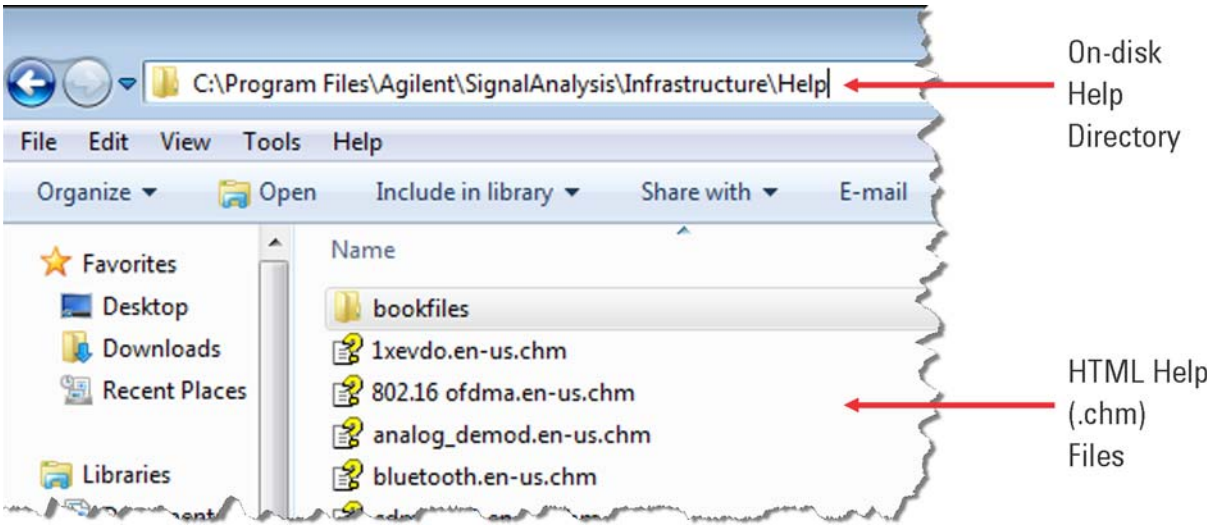
- **Either**, on the documentation CD that came with the instrument,

- **Or**, in a special directory on the instrument's hard disk. The directory path is:

  `C:\Program Files\Keysight\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 software licenses you purchased, the content of the directory on your machine may vary.



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

Copying the Acrobat (PDF) Files

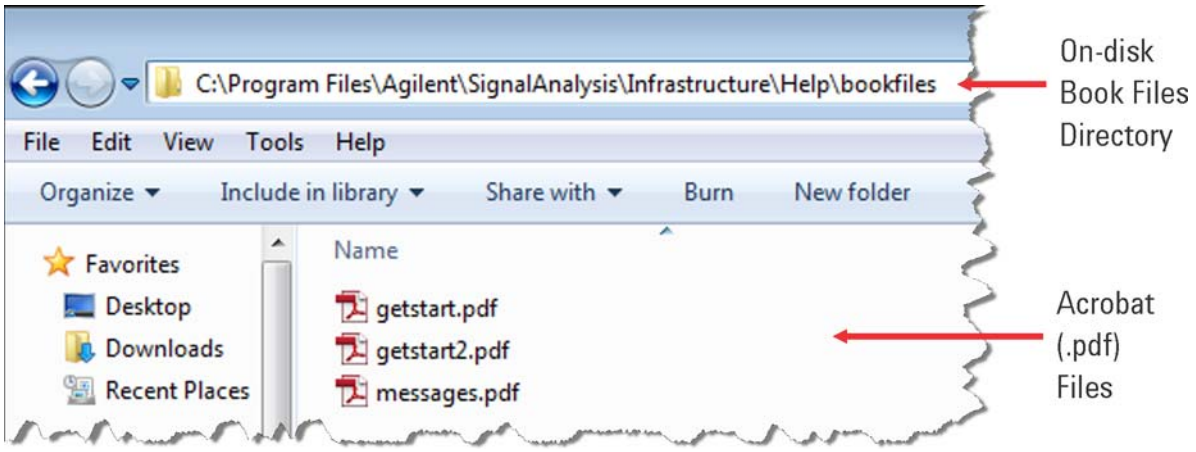
You can copy the Acrobat file(s) you need to a separate computer running any of several different operating systems. Each Acrobat file has a `.pdf` extension.

You can find the Acrobat (`.pdf`) files:

- On the documentation DVD that came with the instrument.
- Three PDF manuals (the "Getting Started and Troubleshooting Guide" for Windows XP- and Windows 7-based instruments, and "Instrument Messages") are located in a special directory on the instrument's hard disk. The directory path is:

  `C:\Program Files\Keysight\SignalAnalysis\Infrastructure\Help\bookfiles`

The illustration below shows an example listing of the Acrobat files in this directory, viewed using Windows Explorer.



Terms Used in This Documentation

Many special terms are used throughout this documentation. Please refer to the Keysight X-Series Signal Analyzer: Getting Started Guide for detailed explanations of all these terms.

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

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

Term	Meaning
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 instrument 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 instrument is powered on or preset using **Power On Last State** or **User Preset**.

2 About the Analyzer

Keysight X-Series instruments measure and monitor complex RF and microwave signals. Analog baseband analysis is available on MXA. X-Series instruments integrate traditional spectrum measurements with advanced vector signal analysis to optimize speed, accuracy, and dynamic range. Each instrument has a built-in Windows operating system, which expands its usability.

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

This chapter includes the following topics:

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 instrument at the time of purchase.

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 instrument to activate the new measurement application. See below for more information.

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

http://www.Keysight.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 instrument.

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

`C:\Program Files\Keysight\Licensing`

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

Obtaining and Installing a License Key

If you purchase an additional application that requires installation, you will receive an “Entitlement Certificate” which may be redeemed for a license key for one instrument. 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:\Program Files\Keysight\Licensing`.

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

Missing and Old Measurement Application Software

All licensed software applications are loaded at the time of original instrument manufacture. It is a good idea to update the instrument software regularly. This ensures that you can take maximum advantage of improvements and expanded functionality.

Check one of the following web sites for the latest available software, according to the name of your instrument:

- http://www.keysight.com/find/mxa_software
- http://www.keysight.com/find/exa_software

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

X-Series Options and Accessories

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

For MXA,

http://www.keysight.com/find/mxa/options

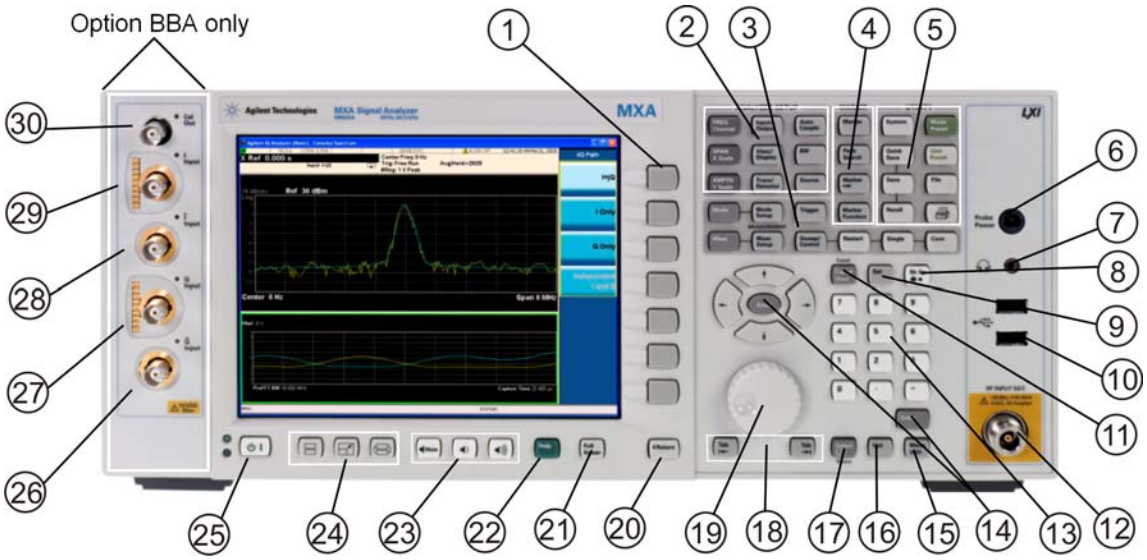
Select the **MXA N9020A, Options and Measurement Applications** link on the top of the page.

For EXA,

http://www.keysight.com/find/exa/options

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

Front-Panel Features



#	Item Name	Description
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: • instrument configuration information and I/O setup, • printer setup and printing, • file management, save and recall, • instrument presets.
6	Probe Power	Supplies power for external high frequency probes and accessories.
7	Headphones Output	Headphones can be used to hear any available audio output.
8	Back Space Key	Press this key to delete the previous character when entering alphanumeric information. It also works as the Back key in Help and Explorer windows.

Item #	Name	Description
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	If you are in remote operation, Local: • returns instrument control from remote back to local (the front panel). • turns the display on (if it was turned off for remote operation). • can be used to clear errors. (Press the key once to return to local control, and a second time to clear error message line.) If you have not already pressed the units or Enter key, Cancel exits the currently selected function without changing its value. Esc works the same as it does on a PC keyboard. It: • exits Windows dialogs • clears errors • aborts printing • cancels operations.
12	RF Input	Connector for inputting an external signal. Make sure that the total power of all signals at the instrument input does **not** 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	The Enter key terminates data entry when either no unit of measure is needed, or you want to use the default unit. The arrow keys: • Increment and decrement the value of the current measurement selection. • Navigate help topics. • Navigate, or make selections, within Windows dialogs. • Navigate within forms used for setting up measurements. • Navigate within tables. **NOTE** The arrow keys cannot be used to move a mouse pointer around on the display.
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.

Item #	Name	Description
20	Return Key	Exits the current menu and returns to the previous menu. Has typical PC functionality.
21	Full Screen Key	Pressing this key turns off the softkeys to maximize the graticule display area. Press the key again to restore the normal display.
22	Help Key	Initiates a context-sensitive Help display for the current Mode. Once Help is accessed, pressing a front panel key brings up the help topic for that key function.
23	Speaker Control Keys	Enables you to increase or decrease the speaker volume, or mute it.
24	Window Control Keys	These keys select between single or multiple window displays. They zoom the current window to fill the data display, or change the currently selected window. They can be used to switch between the Help window navigation pane and the topic pane.
25	Power Standby/ On	Turns the instrument on. A green light indicates power on. A yellow light indicates standby mode. **NOTE** The front-panel switch is a standby switch, **not** a LINE switch (disconnecting device). The instrument continues to draw power even when the line switch is in standby. The main power cord can be used as the system disconnecting device. It disconnects the mains circuits from the mains supply.
26	Q Input	Input port for the Q channel when in differential mode.[a]
27	Q Input	Input port for the Q channel for either single or differential mode.[a]
28	I Input	Input port for the I channel when in differential mode.[a]
29	I Input	Input port for the I channel for either single or differential mode.[a]
30	Cal Out	Output port for calibrating the I, I, Q and Q inputs and probes used with these inputs.[a]

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

Overview of key types

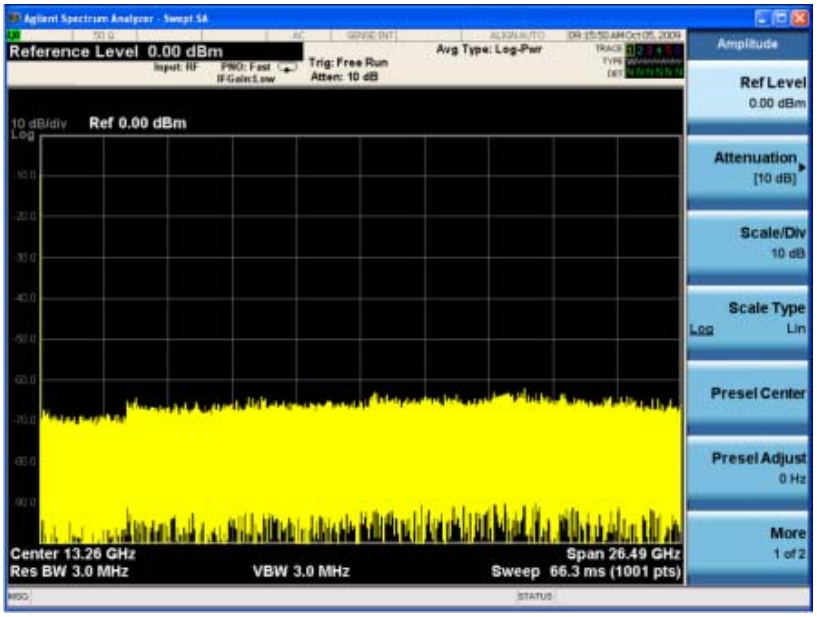
The keys labeled **FREQ Channel**, **System**, and **Marker Function** are all examples of front-panel keys.

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 dependent 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, as shown in Figure 2-1 below. **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.

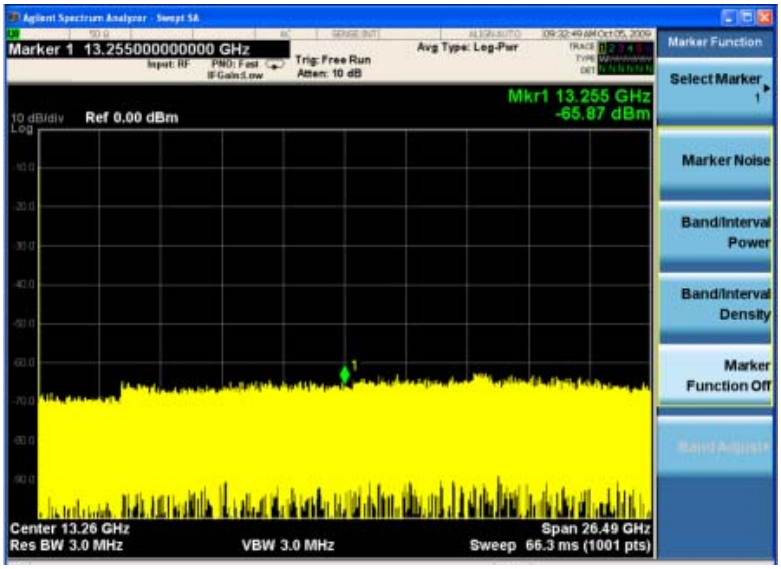
Figure 2-1 Instrument Screen with Amplitude Menu



Some menu keys have multiple choice options on their labels, such as **On**/**Off**, **Auto**/**Man**, or **Log/Lin** (as shown above). The different choices are selected by pressing the key multiple times. As an example, consider the **Auto/Man** option. 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. For example, if you press **Marker Function**, the **Marker Function Off** key is the menu default key, and is highlighted, a shown in Figure 2-2 below.

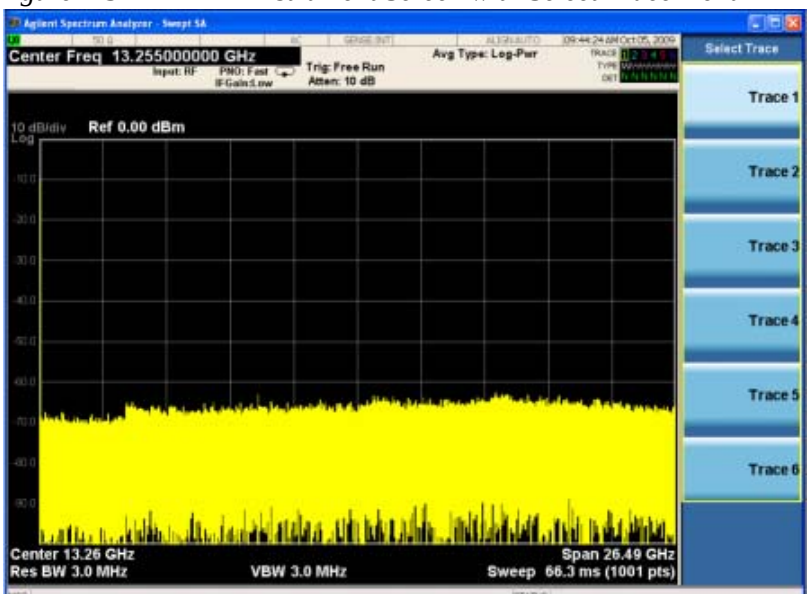
Figure 2-2 Instrument Screen with Marker Function menu



Some menu keys are grouped together, either by a yellow bar running behind the keys near the left side, or by a yellow border around the group of keys as shown in Figure 2-2 above. 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 mutually-exclusive functions, so 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 has more than seven keys, then the keys are split across multiple pages, amd the yellow bar or border could include keys on subsequent pages.

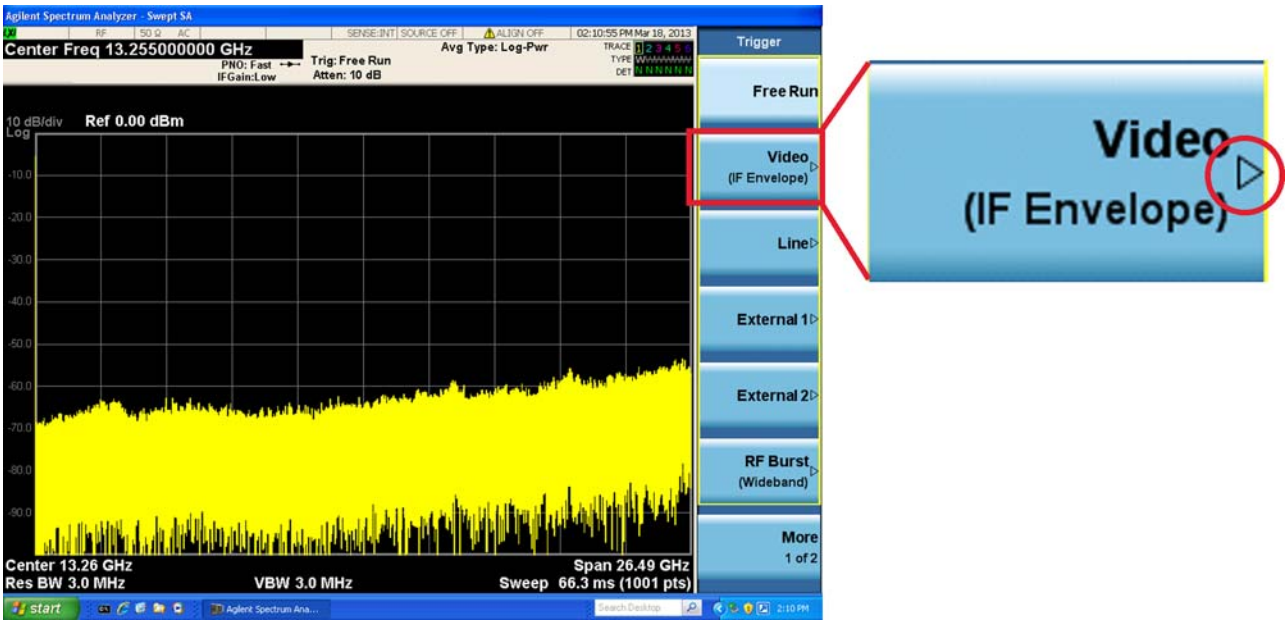
In some key menus, a key label is highlighted to show which key has been selected from multiple available choices, and, when you press one of the other keys, the menu is immediately exited. For example, when you press the **Select Trace** key in the **Trace/Detector** menu, it displays its own menu of keys, as shown in Figure 2-3 below. The **Trace 1** key is initially highlighted. When you press the **Trace 2** key, the highlight moves to that key, and the screen returns to the **Trace/Detector** menu.

Figure 2-3 Instrument Screen with Select Trace menu



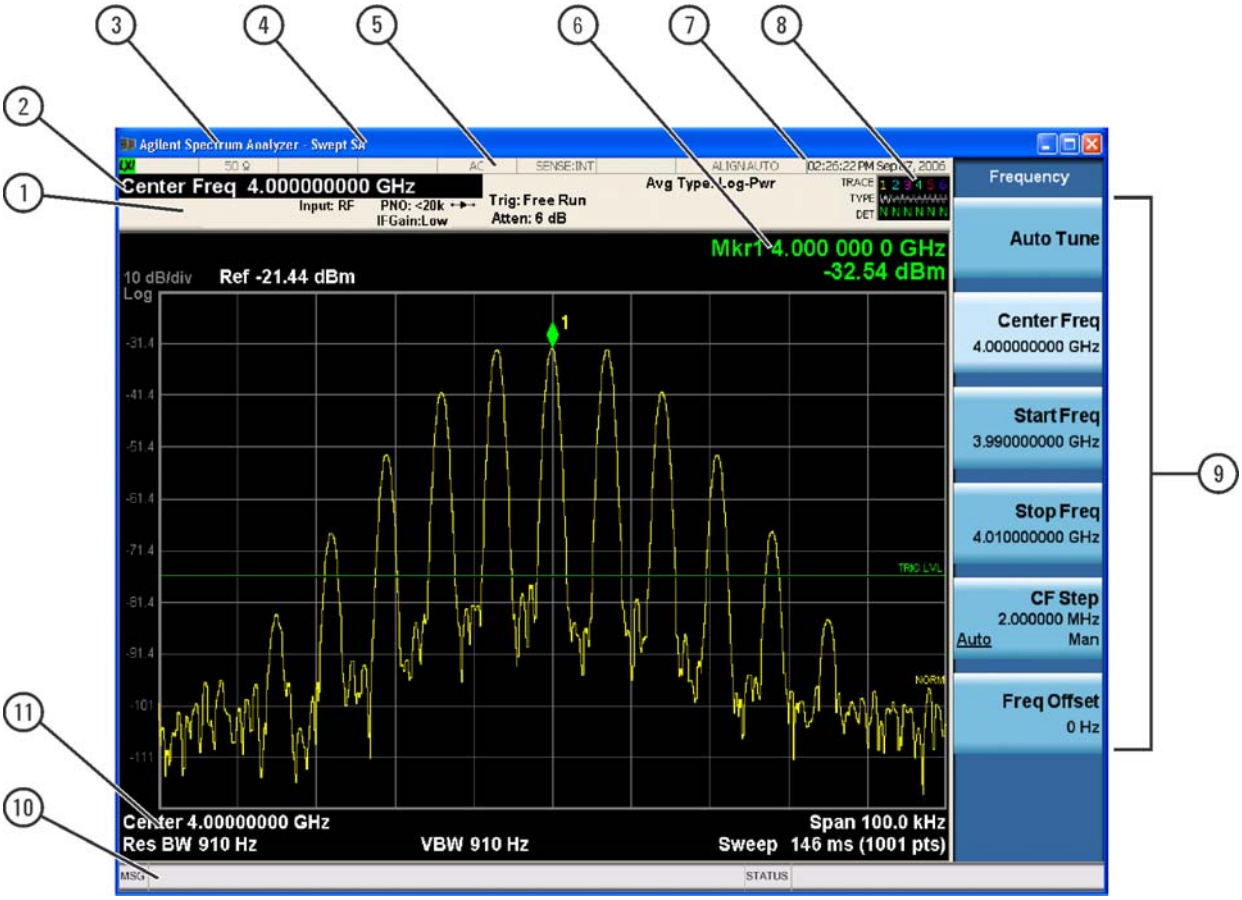
If a displayed key label includes a small black arrow pointing to the right, it indicates that additional key menus are available, as for the **Video** key in the **Trigger** menu shown in Figure 2-4 below. If the arrow tip is not filled in, then pressing the key selects that function and causes the arrow to become filled-in. With the arrow filled-in, pressing the key again displays an additional submenu of settings.

Figure 2-4 Instrument Screen with Trigger menu



Display Annotations

This section describes the display annotation for the Spectrum Analyzer Measurement Application display. Other measurement application modes have some annotation differences.



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

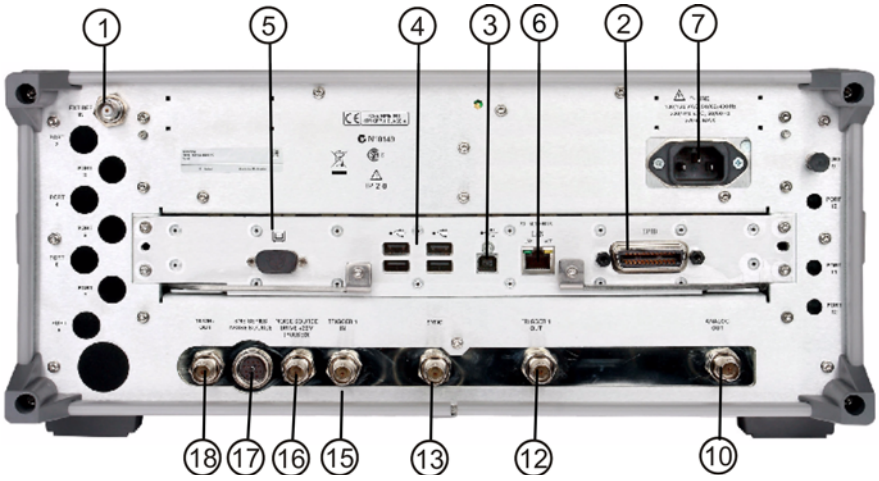
Item	Description	Function Keys
4	Measurement title - shows title information for the current measurement, or a title that you created for the measurement.	**Meas** **View/Display**, **Display**, **Title**
5	Settings panel - displays system information that is not specific to any one application. • Input/Output status - green LXI indicates the LAN is connected. RLTS indicate Remote, Listen, Talk, SRQ • Input impedance and coupling • Selection of external frequency reference • Setting of automatic internal alignment routine	**Local** and **System, I/O Config** **Input/Output**, **Amplitude**, **System** and others
6	Active marker frequency, amplitude or function value	**Marker**
7	Settings panel - time and date display.	**System**, **Control Panel**
8	Trace and detector information	**Trace/Detector**, **Clear Write (W) Trace Average (A) Max Hold (M) Min Hold (m)** **Trace/Detector**, **More, Detector, Average (A) Normal (N) Peak (P) Sample (S) Negative Peak (p)**
9	Key labels that change based on the most recent key press.	Softkeys
10	Displays information, warning and error messages. Message area - single events, Status area - conditions	
11	Measurement settings for the data currently being displayed in the graticule area. In the example above: center frequency, resolution bandwidth, video bandwidth, frequency span, sweep time and number of sweep points.	Keys in the Analyzer Setup part of the front panel.

Rear-Panel Features

PXA, MXA and EXA with Option PC2

EXA

CXA



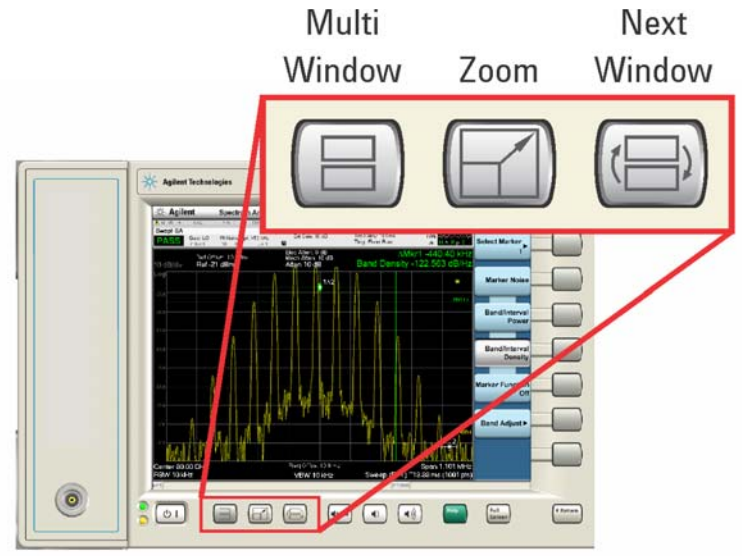
Item		Description
#	Name	
1	EXT REF IN	Input for an external frequency reference signal: For PXA – 1 to 50 MHz For MXA – 1 to 50 MHz For EXA – 10 MHz. For CXA – 10 MHz.
2	GPIB	A General Purpose Interface Bus (GPIB, IEEE 488.1) connection that can be used for remote instrument operation.
3	USB Connector	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 instrument operation.
7	Line power input	The AC power connection. See the product specifications for more details.
8	Removable Disk Drive	Standard on PXA and MXA. Optional on EXA.
9	Digital Bus	Reserved for future use.
10	Analog Out	For PXA option YAV: Screen Video Log Video Linear Video For PXA option EMC: Demod Audio
11	TRIGGER 2 OUT	A trigger output used to synchronize other test equipment with the instrument. Configurable from the Input/Output keys.
12	TRIGGER 1 OUT	A trigger output used to synchronize other test equipment with the instrument. Configurable from the Input/Output keys.
13	Sync	Reserved for future use.

Item		Description
#	Name	
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/Keysight 346A, 346B, and 346C Noise Sources.
17	SNS Series Noise Source	For use with Agilent/Keysight N4000A, N4001A, N4002A Smart Noise Sources (SNS).
18	10 MHz OUT	An output of the instrument's internal 10 MHz frequency reference signal. It is used to lock the frequency reference of other test equipment to the instrument.
19	Preselector Tune Out	Reserved for future use.
20	Aux IF Out	For PXA options: CR3 Second IF Out CRP Arbitrary IF Out ALV Log Video

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. You can find these keys at the bottom left of the instrument’s front panel, as shown in Figure 2-5 below.

Figure 2-5 Front Panel Window Control keys



Multi-Window

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

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

Zoom

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

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

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

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

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

Next Window

Selects the next window of the current view.

When 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>
Initial S/W Revision	Prior to A.02.00

Selected Window

One and only one window is always selected. The selected window has the focus and all key presses are routed to that window.

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

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

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

Navigating Windows

When the Next Window key is pressed, the next window in the order of precedence 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.

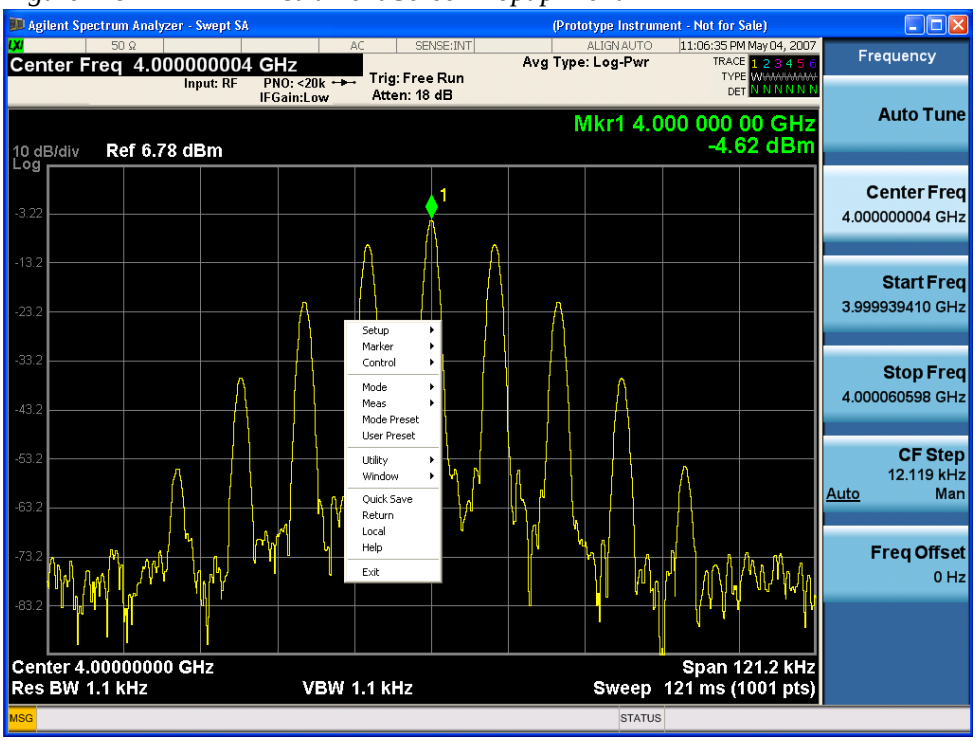
Mouse and Keyboard Control

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

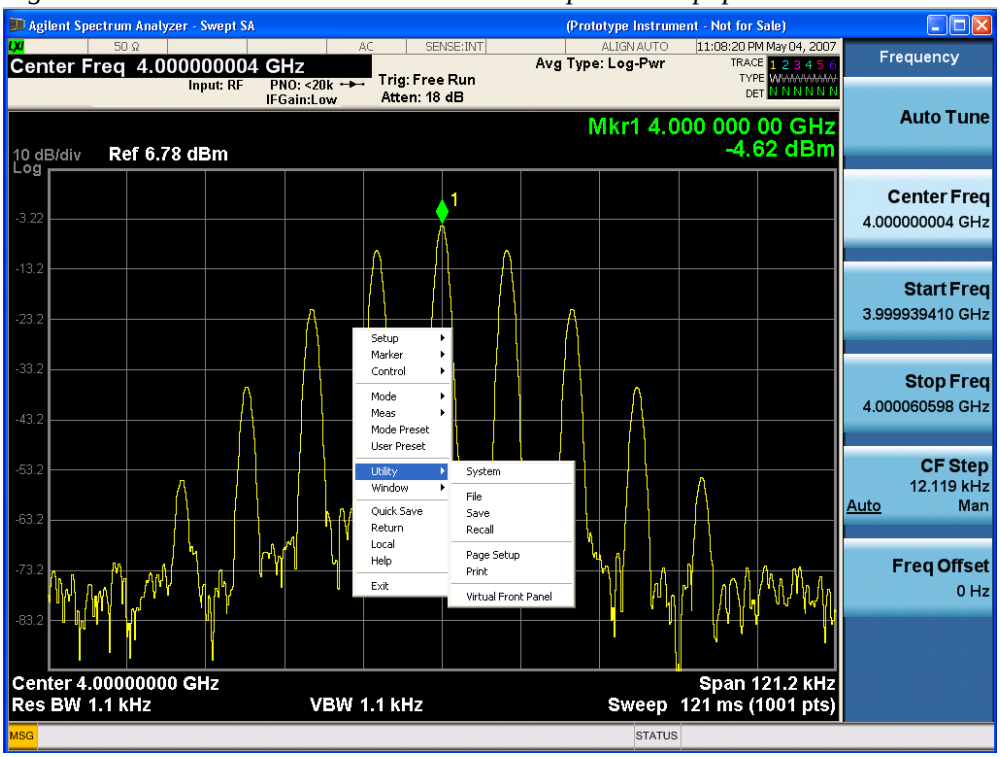
If you plug in a mouse, then right-click within the instrument display area, a popup menu appears as in Figure 2-6 below:

Figure 2-6 Instrument Screen Popup Menu



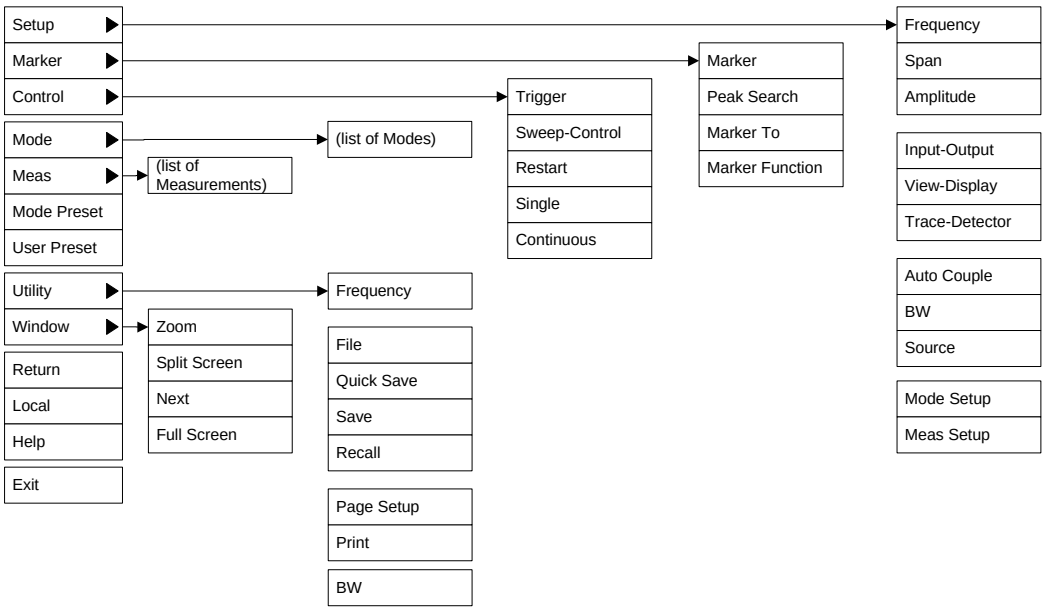
Placing the cursor on one of the menu rows marked with a right arrow symbol causes that row to expand, as shown in Figure 2-7 below, where the cursor is hovered over the “Utility” row:

Figure 2-7 Instrument Screen with Expanded Popup Menu



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 the Remote Desktop feature.

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 instrument front panel. These key codes are shown below:

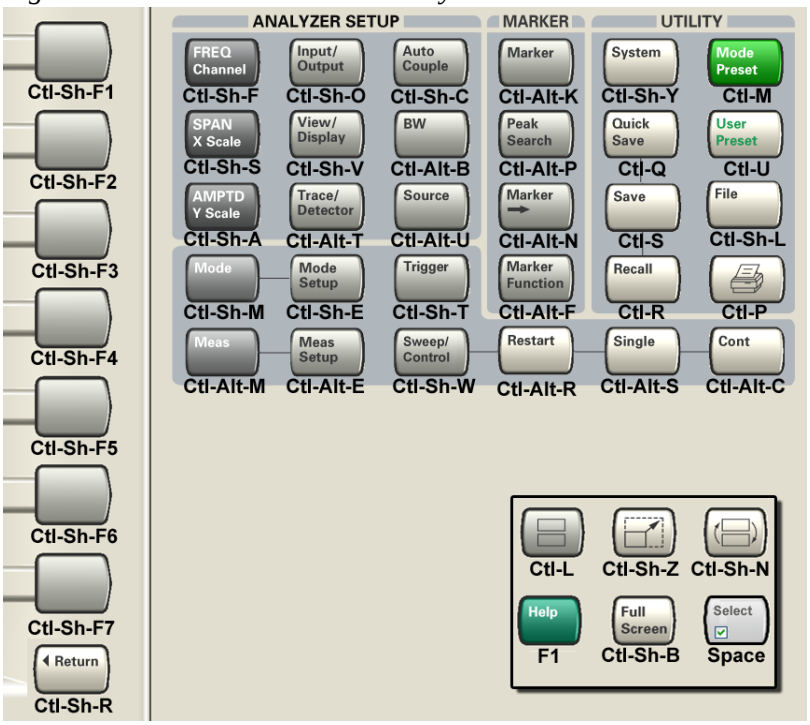
Front-panel key	Key code
Frequency	CTRL+SHIFT+F
Span	CTRL+SHIFT+S
Amplitude	CTRL+SHIFT+A
Input/Output	CTRL+SHIFT+O
View/Display	CTRL+SHIFT+V
Trace/Detector	CTRL+ALT+T
Auto Couple	CTRL+SHIFT+C
Bandwidth	CTRL+ALT+B
Source	CTRL+ALT+U
Marker	CTRL+ALT+K
Peak Search	CTRL+ALT+P
Marker To	CTRL+ALT+N
Marker Function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

Front-panel key	Key code
Sweep/Control	CTRL+SHIFT+W
Restart	CTRL+ALT+R
Single	CTRL+ALT+S
Cont	CTRL+ALT+C
Zoom	CTRL+SHIFT+Z
Next Window	CTRL+SHIFT+N
Split Screen	CTRL+L
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

Front-panel key	Key code
Menu key 6	CTRL+SHIFT+F6
Menu key 7	CTRL+SHIFT+F7
Backspace	BACKSPACE
Enter	ENTER
Tab	Tab
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
0	0

Figure 2-8 below shows a pictorial view of the information in the table above.

Figure 2-8 Front Panel Key Codes



Instrument Security & Memory Volatility

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

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

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

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

To locate and download the document, select Model Number "N9020A", then click "Submit". Then, follow the on-screen instructions to download the file.

3 Introduction

This chapter provides overall information on the Keysight N9073A XFP Combined W-CDMA Measurement Application and describes the measurements made by the instrument.

What Does the Keysight N9073A Combined W-CDMA Measurement Application Do?

The Combined W-CDMA Measurement Application is a full-featured W-CDMA (3GPP) signal analyzer that can help determine if a W-CDMA modulated source or transmitter is working correctly.

N9073A XFP adds the Combined W-CDMA measurement and a List Power Step measurement to the standard N9073A W-CDMA measurement application. Combined W-CDMA is a special measurement for manufacturing of W-CDMA devices. The aim of this measurement is to optimize measurement speed. Some measurements are combined into a single package to prevent time consuming measurement switching. In addition to this, ACP can be measured simultaneously with EVM measurements.

The Combined W-CDMA Application provides:

- List Power Step measurement
- Modulation Accuracy (Rho)
- QPSK EVM
- ACP
- Triggering
- Time Gating

NOTE This manual **supplements** the standard N9073A & W9073A W-CDMA & HSPA Measurement Applications User's & Programmer's Reference and Help. Only features specific to the N9073A XFP Combined W-CDMA Measurement Application are documented here.

4 Programming the Analyzer

This chapter provides introductory information about the programming documentation included with your product. It includes the following topics:

What Programming Information is Available?

The X-Series Documentation can be accessed through the *Additional Documentation* page in the instrument Help system, or online in the Agilent/Keysight X-Series Document Library. Most documents are also included on the Documentation DVD shipped with the instrument

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

Resource	Description
X-Series Programmer's Guide	Provides general SCPI programming information on the following topics: • Programming the X-Series Applications • Programming fundamentals • Programming examples Note that SCPI command descriptions for measurement applications are **not** in this book, but are in the User's and Programmer's Reference.
N9073A & W9073A W-CDMA & HSPA Measurement Applications User's & Programmer's Reference	Describes all front-panel keys and softkeys, including SCPI commands for a measurement application. Note that: • Each measurement application has its own User's and Programmer's Reference. • The content in this manual is duplicated in the instrument's Help (the Help that you see for a key is identical to what you see in this manual).
Embedded Help in your instrument	Describes all front-panel keys and softkeys, including SCPI commands, for a measurement application. Note that the content that you see in Help when you press a key is identical to what you see in the User's and Programmer's Reference.
Keysight X-Series Signal Analyzer: Getting Started Guide	Provides valuable sections related to programming including: • Licensing New Measurement Application Software - After Initial Purchase • Configuring instrument LAN Hostname, IP Address, and Gateway Address • Using the Windows XP Remote Desktop to connect to the instrument remotely • Using the Embedded Web Server Telnet connection to communicate SCPI This printed document is shipped with the instrument.
Agilent/Keysight Application Notes	Printable PDF versions of pertinent application notes.

Resource	Description
Agilent/Keysight I/O Libraries Suite documentation	Describes the Agilent/Keysight Virtual Instrument Software Architecture (VISA) library and shows how to use it to develop I/O applications and instrument drivers on Windows PCs.

IEEE 488.2 Common Commands

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

Calibration Query (All)

`*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]?`.

For details of `*CAL?`, see "System", "Alignments" in the "System Functions" section of the W-CDMA Measurement Application User's & Programmer's Reference.

Clear Status

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

Key Path	No equivalent key. Related key **System**, **Show Errors**, **Clear Error Queue**
Remote Command	`*CLS`
Example	*CLS Clears the error queue and the Status Byte Register.
Notes	For related commands, see the SYSTem:ERRor[:NEXT]? command. See also the STATus:PRESet command and all commands in the STATus subsystem.
Status Bits/OPC dependencies	Resets all bits in all event registers to 0, which resets all the status byte register bits to 0 also.
Initial S/W Revision	Prior to A.02.00

Standard Event Status Enable

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

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

Key Path	No equivalent key. Related key **System**, **Show Errors**, **Clear Error Queue**

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

Standard Event Status Register Query

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

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

Identification Query

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

The response is organized into four comma-separated fields. The field definitions are as follows:

1. Manufacturer
2. Model
3. Serial number
4. Firmware version

Key Path	No equivalent key. See related key **System**, **Show System**.
Remote Command	`*IDN?`
Example	*IDN? Returns instrument identification information, such as: Agilent/Keysight Technologies,N9020A,US01020004,A.01.02
Initial S/W Revision	Prior to A.02.00

Instrument Model Number

`ID?`

Returns an instrument identification string. The string contains the model number.

When the current Measurement Application is Remote Language Compatibility, the query returns the model number of the emulated instrument. When in any other Measurement Application, the returned model number is that of the actual hardware.

Operation Complete

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

Remote Command	`*OPC` `*OPC?`
Example	INIT:CONT 0 Selects single sweeping. INIT:IMM Initiates a sweep. *OPC? Holds off any further commands until the sweep is complete.
Status Bits/OPC dependencies	Not global to all remote ports or front panel. *OPC only considers operation that was initiated on the same port as the *OPC command was issued from. *OPC is an overlapped command, but *OPC? is sequential.
Initial S/W Revision	Prior to A.02.00

Query Instrument Options

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

To be fully IEEE-compliant, this command should return an arbitrary ASCII variable that does not begin and end with quotes. However, the quotes are needed for backward compatibility with previous Agilent products and software.

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

Recall Instrument State

Recalls the instrument state from the specified instrument memory register.

- If the state being loaded has a newer firmware revision than the revision in the instrument, no state is recalled and an error is reported
- If the state being loaded has the same firmware revision as that in the instrument, the state is loaded.
- If the state being loaded has an older firmware revision than the revision in the instrument, the instrument loads only the parts of the state that apply to the older revision.

Remote Command	`*RCL <register #>`
Example	*RCL 7 Recalls the instrument state that is currently stored in register 7.
Notes	Registers 0 through 6 are accessible from the front panel in menu keys for Recall Registers.
Min	0
Max	127
Status Bits/OPC dependencies	The command is sequential.
Initial S/W Revision	Prior to A.02.00

*RST

`*RST` is equivalent to `:SYSTem:PRESet;:INITiate:CONTinuous OFF`, which is a Mode Preset in the Single measurement state. This remote command is preferred over the Mode Preset remote command (`:SYSTem:PRESet`), as optimal remote programming occurs with the instrument in the single measurement state.

Remote Command	`*RST`
Example	*RST

Notes	Sequential Clears all pending OPC bits and the Status Byte is set to 0.
Couplings	*RST causes the currently running measurement to be aborted, and switches to the default measurement. *RST sets the mode to a consistent state, with all of the default couplings restored.
Backwards Compatibility Notes	In legacy analyzers, `*RST` did not set the instrument to Single, but in the X-Series it does, to comply with the IEEE 488.2 specification. In X-Series, `*RST` does not perform a `*CLS` (clear the status bits and the error queue), to comply with IEEE 488.2. In legacy analyzers, `*RST` did the equivalent of `:SYSTem:PRESet`, `*CLS` and `:INITiate:CONTinuous OFF`.
Initial S/W Revision	Prior to A.02.00

Save Instrument State

Saves the current instrument state and mode to the specified instrument memory register.

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

Service Request Enable

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

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

Remote Command	`*SRE <integer>` `*SRE?`
Example	*SRE 22 Enables bits 1, 2, and 4 in the service request enable register.
Notes	For related commands, see the STATus subsystem and SYSTem:ERRor[:NEXT]? commands.
Preset	0

Min	0
Max	255
Status Bits/OPC dependencies	Service Request Enable Register (all bits, 0 – 7).
Initial S/W Revision	Prior to A.02.00

Status Byte Query

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

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

Trigger

Triggers the instrument. Use the `:TRIGger[:SEQuence]:SOURce` command to select the trigger source.

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

Self Test Query

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

Remote Command	`*TST?`
Example	*TST? Runs the self-test routines and returns 0=passed, 1=some part failed.

Initial S/W Revision	Prior to A.02.00

Wait-to-Continue

Causes the instrument to wait until all overlapped commands are completed before executing any additional commands.

There is no query form for the command.

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

Remote Measurement Functions

Specific instrument commands for set up and initiation of measurements are provided in the User's and Programmer's Reference and in the instrument Help system under the MEASure command and under the specific measurement **Meas** softkey.

Once measurement parameters have been correctly configured, in general, there are two methods of obtaining measurement results remotely:

1. By using the Measurement Group of Commands,
2. By using the Common Measurement Commands.

Measurement Group of Commands

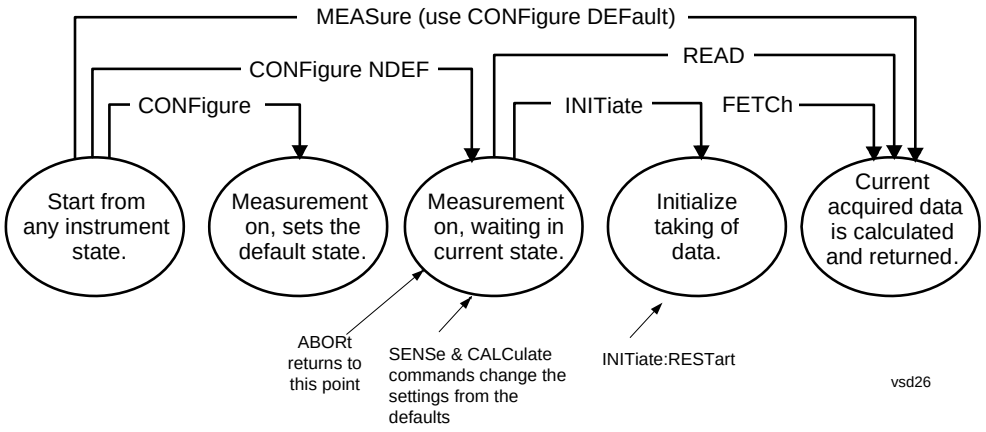
The Measurement family of commands comprises the MEASure Command, which executes the entire measurement, plus the CONFigure Commands, FETCh Command, INITiate Command and READ Command, which each accomplish only a part of the overall measurement. FETCh and READ are queries only.

You can optimize measurements by creating programs that call MEASure and CONFigure a minimum number of times, and that emphasize repeated READ, INITiate, and FETCh commands.

Figure 4-1 below illustrates the interactions between the Measurement family of commands: MEASure, CONFigure, FETCh, INITiate and READ.

NOTE Not all measurements support all the commands MEASure, CONFigure, FETCh, INITiate and READ. For measurement-specific information, see the introduction to each measurement in the User's and Programmer's References or online Help.

Figure 4-1 Measurement Group of Commands



MEASure Command

:MEASure:<measurement>[n]?

This is a fast, single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the currently-selected Mode Setup settings (for example, Radio Standard).

Sending this query:

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- Turns on averaging (if the function does averaging), and sets the number of averages to 10, 25, or 50, depending upon the current measurement.
- After the data is valid, returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the query.

  The scalar measurement results are returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results are returned.

  ASCII is the default format for the data output. The binary data formats should be used for handling large blocks of data since they are more compact than the ASCII format. Refer to "FORMat:DATA (Numeric Data Format)" on page 91 for more information.

If you need to change some of the measurement parameters from the factory default settings, you can set up the measurement with the :CONFigure:<measurement> command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then use the READ? query to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? query to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. If you want to use the persistent settings, use READ:<measurement>? If you want to revert to the default settings, use MEASure:<measurement>?

CONFigure Commands

:CONFigure:<measurement>

Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory default instrument settings.

The command does not initiate collection of measurement data unless INITiate:CONTinuous is ON. If you change any measurement settings after using the CONFigure command, the READ? query can be used to initiate a measurement without reverting settings to their defaults.

:CONFigure:NDEFault<measurement>

Stops the current measurement and changes to the specified measurement.

Does not change the settings to the defaults.

Does not initiate collection of measurement data unless `INITiate:CONTinuous` is ON.

:CONFigure?

Returns the current measurement name.

FETCh Command

:FETCh:<measurement>[n]?

Puts selected data from the most recent measurement into the output buffer. Use `FETCh` if you have already made a valid measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. `FETCh` saves you the time of repeating the measurement. You can only `FETCh` results from the measurement that is currently active; it will not change to a different measurement. An error is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the `READ?` query, which is equivalent to an `INITiate` followed by a `FETCh`.

If the optional [n] parameter is not included, or is set to 1, the scalar measurement results are returned. See each command for details of what types of scalar results or trace data results are available.

For large blocks of data, use the binary data formats, since they are more compact then the ASCII format. (For the data format command, see "FORMat:DATA (Numeric Data Format)" on page 91)

`FETCh` may be used to return results other than those specified with the original `READ` or `MEASure` command that you sent.

INITiate Command

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes.

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the :FETCh:<measurement>[n]? query to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.

  For example, suppose you have previously initiated the ACP measurement, but now you are running the Channel Power measurement. If you send `INITiate:ACPower`, the measurement changes from Channel Power to ACP, and an ACP measurement is initiated.

- Does not change any of the measurement settings.

  For example, if you have previously started the ACP measurement and you send `INITiate:ACPower`, a new ACP measurement is initiated using the same instrument settings as the last time ACP was run.

- Triggers the measurement, if your selected measurement is currently active (in the idle state), and assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. Also holds off additional commands on GPIB until the acquisition is complete.

READ Command

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP measurement and you send `READ:ACPower?`, a new measurement is initiated using the same instrument settings.
- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.

  For example, suppose you have previously initiated the ACP measurement, but now you are running the Channel Power measurement. If you then send `READ:ACPower?`, the measurement changes from Channel Power back to ACP and, using the previous ACP settings, the measurement is initiated and results are returned.
- Blocks other SCPI communication, waiting until the measurement is complete before returning the results

  If the optional [n] value is not included, or is set to 1, the scalar measurement results are returned.

  If the [n] value is set to a value other than 1, the selected trace data results are returned. See each command for details of what types of scalar results or trace data results are available.

  For large blocks of data, use the binary data formats, since they are more compact than the ASCII format. (For the data format command, see “FORMat:DATA (Numeric Data Format)” on page 91)

Common Measurement Commands

This group includes the following commands:

Current Measurement Query

Returns the name of the measurement that is currently running.

Remote Command	`:CONFigure?`
Example	CONF?

Test Current Results against All Limits

Queries the status of the current measurement limit testing.

- Returns 0 if the measured results pass when compared with the current limits.
- Returns 1 if the measured results fail any limit tests.

Remote Command	`:CALCulate:CLIMits:FAIL?`
Example	CALC:CLIM:FAIL? queries the current measurement to check whether it fails the defined limits. Returns a 0 or 1 for Pass or Fail respectively.

Data Query

Returns the designated measurement data for the currently selected measurement and subopcode.

n	Any valid subopcode for the current measurement. For details of the data returned for each subopcode, see the measurement command results table for the current measurement.

This command uses the data setting specified by the FORMat:BORDer (Byte Order) and FORMat:DATA (Numeric Data Format) commands and can return real or ASCII data.

Remote Command	`:CALCulate:DATA[n]?`
Remote Command Notes	The return trace depends on the measurement. `n` is any valid subopcode for the currently-selected measurement. This query returns the same data as the `:FETCh:<meas>?` query, where `<meas>` is the currently-selected measurement.

Calculate/Compress Trace Data Query

Returns compressed data for the currently selected measurement and subopcode <n>.

n	Any valid subopcode for the measurement. For details of the data that can be returned, see the `MEASure:<measurement>?` command description of the specific measurement.

The data is returned in the current Y Axis Unit of the instrument. The command is used with a subopcode <n> (default = 1) to specify the trace. For trace queries, it is best if the instrument is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep (Update = Off).

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

Remote Command	`:CALCulate:DATA<n>:COMPress?`
	`BLOCk|CFIT|MAXimum|MINimum|MEAN|DMEan|RMS|RMSCubed|SAMPle|SDEViation|PPHase`
	`[,<soffset>[,<length>[,<roffset>[,<rlimit>]]]]`

Example	To query the mean power of a set of GSM bursts: 1. Supply a signal that is a set of GSM bursts. 2. Select IQ Analyzer Mode, then select the IQ Waveform measurement. 3. Set the sweep time to acquire at least one burst. 4. Set the triggers such that acquisition happens at a known position relative to a burst. 5. Then query the mean burst levels using, `CALC:DATA2:COMP? MEAN,24e-6,526e-6` (These parameter values correspond to GSM signals, where 526e–6 is the length of the burst in the slot, and you want 1 burst.)
Remote Command Notes	The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. If present, these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See "Sample Trace Data" on page 87 for a definition of each of these parameters. This command accepts data in the format specified by FORMat:DATA (Numeric Data Format), returning either binary or ASCII data.

Table 4-1 Calculate/Compress Trace Data Options

Option	Description
BLOCk	Block data Returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)
CFIT	Curve fit Applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).
MINimum[a]	Returns the minimum data point (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
MAXimum[a]	Returns the maximum data point (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.

Table 4-1 Calculate/Compress Trace Data Options

Option	Description
MEAN[a]	Returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations. **NOTE** If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power, which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option. **Equation 1: Mean Value of Data Points for Specified Region(s)** $$MEAN = \frac{1}{n} \sum_{Xi \in \text{region(s)}} Xi$$ vsd27-1 where Xi is a data point value, and n is the number of data points in the specified region(s). **Equation 2: Mean Value of I/Q Data Pairs for Specified Region(s)** $$MEAN = \frac{1}{n} \sum_{Xi \in \text{region(s)}} |Xi|$$ vsd27-2 where |Xi| is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).
DMEan[a]	Returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation: **Equation 3: DMEan Value of Data Points for Specified Region(s)** $$DME = 10 \times \log_{10}\left(\frac{1}{n} \sum_{Xi \in \text{region(s)}} 10^{\frac{Xi}{10}}\right)$$ vsd27-3

Table 4-1 Calculate/Compress Trace Data Options

Option	Description
RMS[a]	Returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation. For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. **NOTE** This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values, which is not usually needed. **Equation 4: RMS Value of Data Points for Specified Region(s)** $$RMS = \sqrt{\frac{1}{n} \sum_{Xi \in \text{region(s)}} Xi^2}$$ vsd27-4 where Xi is a data point value, and n is the number of data points in the specified region(s). **Equation 5: RMS Value of I/Q Data Pairs for Specified Region(s)** $$RMS = \sqrt{\frac{1}{n} \sum_{Xi \in \text{region(s)}} Xi \; Xi^*}$$ vsd27-5 where Xi is the complex value representation of an I/Q pair, Xi* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s). Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm via: $10 \times \log[10 \times (\text{rms value})^2]$
SAMPle[a]	Returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.

Table 4-1 Calculate/Compress Trace Data Options

Option	Description
SDEViation[a]	Returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation. For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equations. **Equation 6: Standard Deviation of Data Point Values for Specified Region(s)** $$SDEV = \sqrt{\frac{1}{n}\sum_{Xi \in \text{region(s)}}(Xi - \overline{X})^2}$$ vsd27-7 where Xi is a data point value, X is the arithmetic mean of the data point values for the specified region(s), and n is the number of data points in the specified region(s). $$SDEV = \sqrt{\frac{1}{n}\sum_{Xi \in \text{region(s)}}(|Xi| - \overline{X})^2}$$ vsd27-8 where |Xi| is the magnitude of an I/Q pair, X is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

Table 4-1 Calculate/Compress Trace Data Options

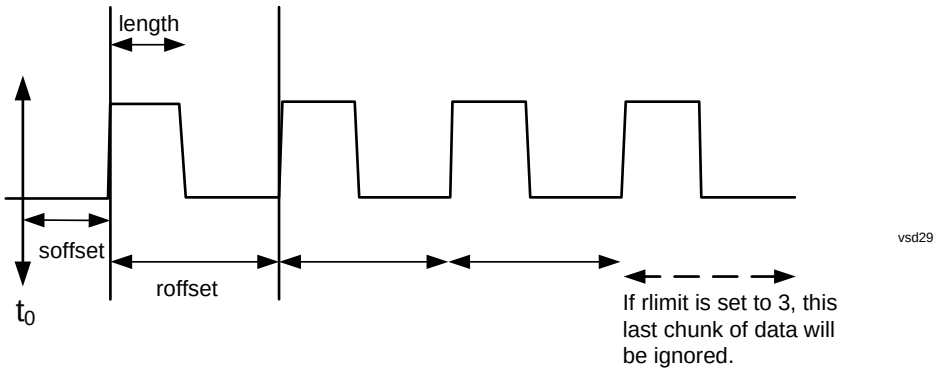
Option	Description
PPHase[a]	Returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector (n=0) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase. The rms power of the specified region may be expressed as: Power = 10 x log [10 x (RMS I/Q value)] + 10. The RMS I/Q value (peak volts) is: $\sqrt{\frac{1}{n}\sum_{Xi \in \text{ region}} Xi\ Xi^*}$ vsd27-9 where Xi is the complex value representation of an I/Q pair, Xi* its conjugate complex number, and n is the number of I/Q pairs in the specified region. The arithmetic mean phase of the specified region may be expressed as: $\frac{1}{n}\sum_{Yi \in \text{ region}} Yi$ vsd27-10 where Yi is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region. The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

a. MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Alternatively, they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

Sample Trace Data

Constant Envelope

(See Table 4-2 below for explanation of variables.)



Non Constant Envelope

(See Table 4-2 below for explanation of variables.)

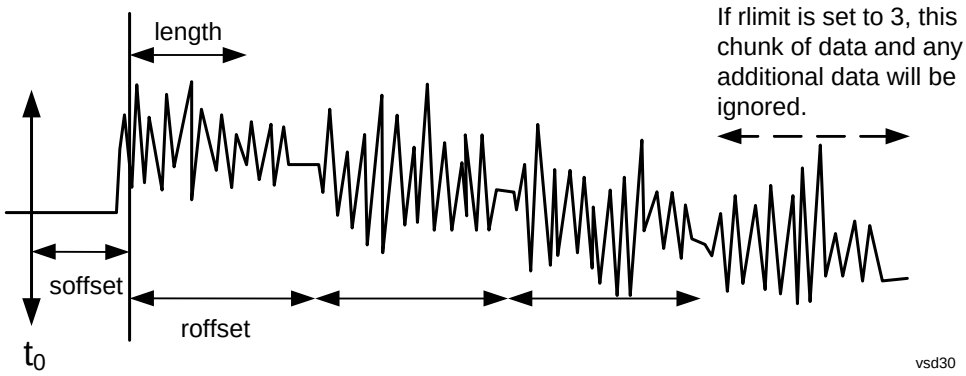


Table 4-2 Trace Data Variable Definitions

Variable	Description
<soffset>	Start Offset is an optional real number. Its unit is seconds for time-domain traces, and is a dimensionless index 0 to Npoints – 1, for frequency-domain traces. It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

Table 4-2 Trace Data Variable Definitions

Variable	Description
<length>	An optional real number. Its unit is seconds for time-domain traces, and is a dimensionless index 0 to Npoints – 1, for frequency-domain traces. It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.
<roffset>	Repeat Offset is an optional real number. It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints – 1, for frequency-domain traces. It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).
<rlimit>	Repeat Limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data

Returns a list of all the peaks for the currently selected measurement and subopcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n	Any valid subopcode for the measurement. For details of the data that can be returned, see the `MEASure:<measurement>?` command description of the specific measurement.

The command can only be used with specific subopcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements, the subopcode n=0 returns the raw trace data, which cannot be searched for peaks. Similarly, for many measurements, subopcode n=1 returns calculated results values, which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDer (Byte Order) and FORMat:DATA (Numeric Data Format) commands and can return real or ASCII data. If the format is set to `INT,32`, it returns `REAL,32` data.

The command has four types of parameters:

1. Threshold (in dBm)
2. Excursion (in dB)
3. Sorting order (amplitude, frequency, time)

4. Optional in some measurements: Display line use (all, > display line, < display line)

Remote Command	`:CALCulate:DATA[1]|2|3|4|5|6:PEAKs? <real>,<real>[,AMPLitude|FREQuency|TIME[,ALL|GTDLine|LTDLine]]`

Remote Command	For Swept SA measurement:
	`:CALCulate:DATA[1]|2|3|4|5|6:PEAKs? <threshold>,<excursion>[,AMPLitude|FREQuency|TIME[,ALL|GTDLine|LTDLine]]`
	For most other measurements:
	`:CALCulate:DATA[1]|2|3|4|5|6:PEAKs? <threshold>,<excursion>[,AMPLitude|FREQuency|TIME]`

Example	Example for Swept SA measurement in Spectrum Analyzer Mode: CALC:DATA4:PEAK? –40,10,FREQ,GTDL This will identify the peaks of trace 4 that are above –40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned. Query Results 1: With FORMat:DATA REAL,32 selected, returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time). If no peaks are found the peak list consists of only the number of peaks, (0).

Remote Command Notes	<n> - is the trace that will be used <threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as –200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu. <excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the excursion value stored under the Peak Criteria menu. Sorting order: • AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent) • FREQuency - lists the peaks in order of occurrence, left to right across the x-axis. • TIME - lists the peaks in order of occurrence, left to right across the x-axis. Peaks vs. Display Line: • ALL - lists all of the peaks found (default if optional parameter not sent). • GTDLine (greater than display line) - lists all of the peaks found above the display line. • LTDLine (less than display line) - lists all of the peaks found below the display line.
Dependencies/Couplings	Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL). Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line, which is used by this command to determine whether a peak should be reported.

FORMat:DATA (Numeric Data Format)

Specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the `:TRACe[:DATA]`, `:TRACe[:DATA]?`, `:CALCulate:DATA[n]?` and `:FETCh:SANalyzer[n]?` commands and queries.

Remote Command	`:FORMat[:TRACe][:DATA] ASCii|INTeger,32|REAL,32|REAL,64` `:FORMat[:TRACe][:DATA]?`
Dependencies/ Couplings	Sending a data format spec with an invalid number (for example, `INT,48`) generates no error. The instrument uses the default format (8 for `ASCii`, 32 for `INTeger`, 32 for `REAL`). Sending data to the instrument that does not conform to the current specified FORMat results in an error.
Remote Command Notes	The query response is: ASCii: ASC,8 REAL,32: REAL,32 REAL,64: REAL,64 INTeger,32: INT,32 When the numeric data format is `REAL` or `ASCii`, data is output in the current Y Axis unit. When the data format is `INTeger`, data is output in units of m dBm (0.001 N dBm). Note that the `INT,32` format applies only to the command `TRACe:DATA`. This preserves backwards compatibility for the Swept SA measurement. For all other commands and queries that honor FORMat:DATA (Numeric Data Format), if `INT,32` is sent the instrument behaves as though it were set to `REAL,32`. The `INT,32` format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.
Preset	ASCii

The specifications for each output type follow:

Format Type	Description
ASCii	Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit. Values are separated by commas. Each value has the form: `SX.YYYYYEsZZ` Where: `S` = sign (+ or –) `X` = one digit to left of decimal point `Y` = 5 digits to right of decimal point `E` = Exponent header (always "E") `s` = sign of exponent (+ or –) `ZZ` = two digit exponent
REAL,32	Binary 32-bit real values in the current Y Axis Unit, in a definite length block.
REAL,64	Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

FORMat:BORDer (Byte Order)

Selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the `TRACe[:DATA]`, `TRACe[:DATA]?`, `CALCulate:DATA[n]?` and `FETCh:<meas>[n]?` commands and queries.

By definition, any command that honors FORMat:DATA (Numeric Data Format) uses any format supported by `FORMat:DATA`.

In `NORMal` order, the byte sequence is **big-endian**, that is it begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4.

In `SWAPped` order, the byte sequence is **little-endian**, that is it begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

Remote Command	`:FORMat:BORDer NORMal|SWAPped` `:FORMat:BORDer?`
Preset	NORMal

Status Register System & SCPI STATus Subsystem

This section includes the following topics:

Status Register System Overview

The X-Series Status Register Subsystem implementation is shown in Figure 4-2 on page 94 and Figure 4-3 on page 95. For readability, the diagram is spread across two pages.

Figure 4-2 X-Series Status Register System (1)

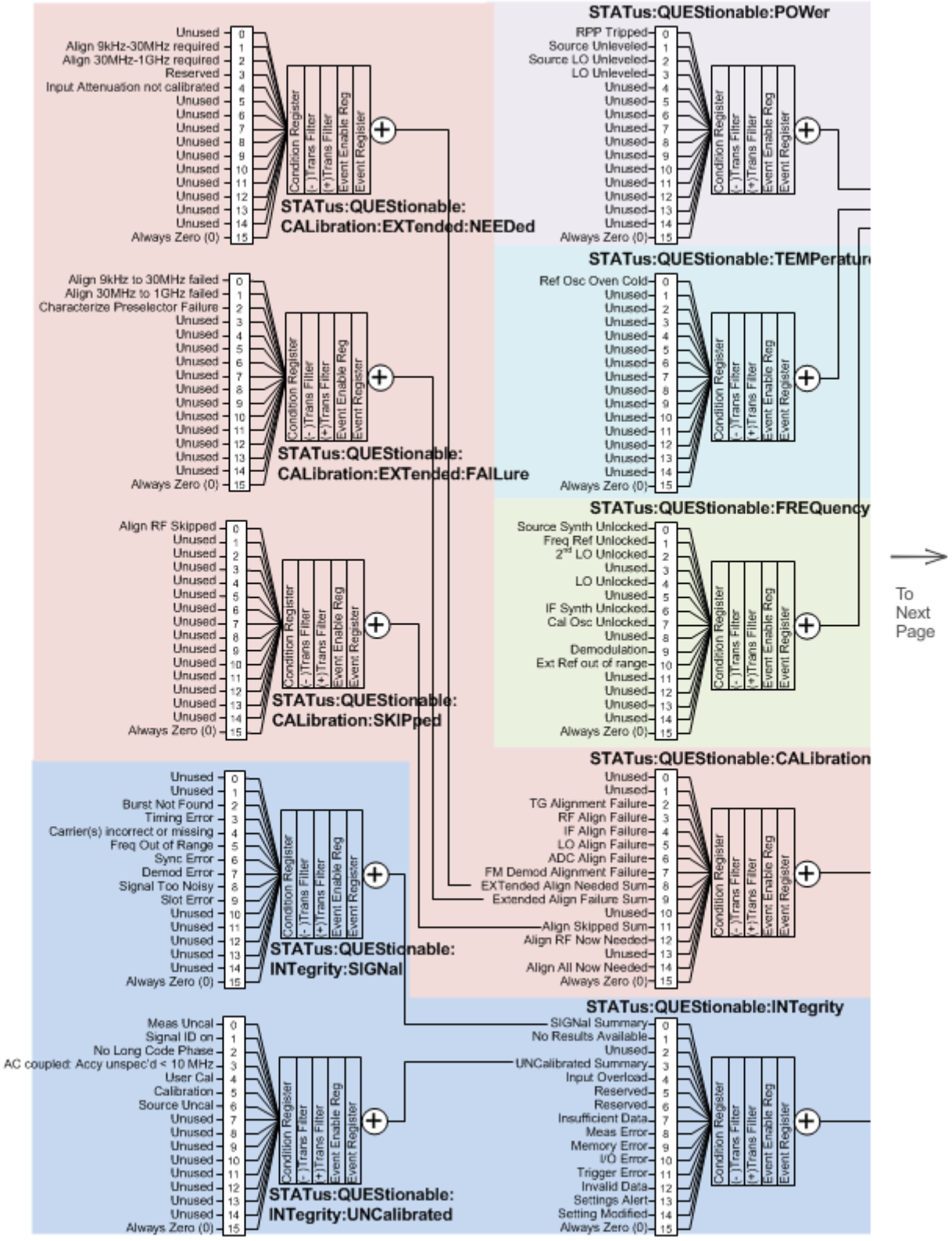
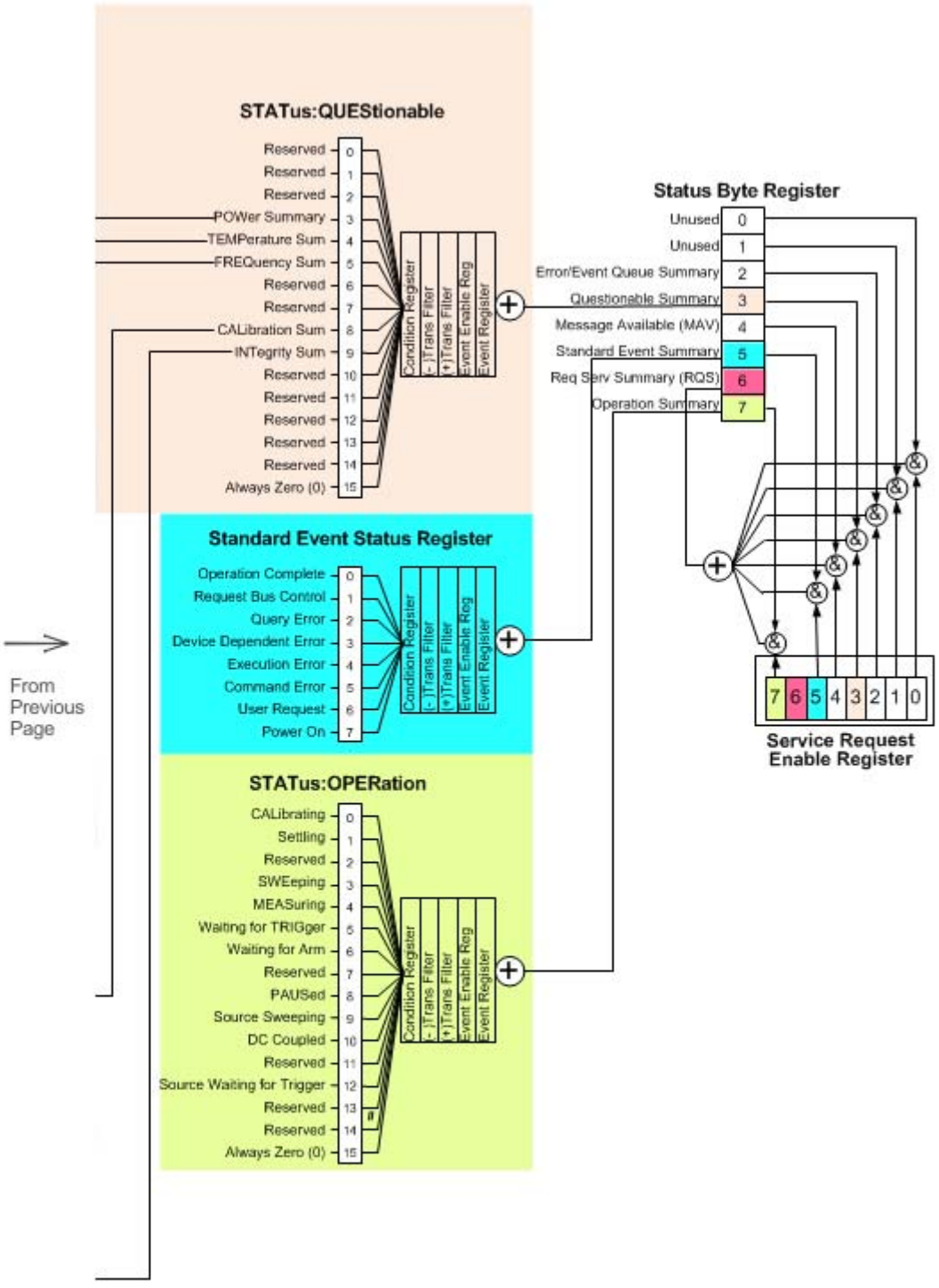


Figure 4-3 X-Series Status Register System (2)



Detailed Description

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

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

X-Series 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 Figure 4-2 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 consists of five registers, as follows:

Register Name	Function
Condition	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	A filter register that 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	A filter register that 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	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	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 4-2 on page 94 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.

IEEE 488.2 Common Commands for Status Monitoring

Most monitoring of the instrument conditions is done at the highest level using the IEEE 488.2 Common commands listed in Table 4-3 below. Complete command descriptions are available in the chapter *Common Commands and Queries* of IEEE Standard 488.2–1992.

The instrument's individual status registers may be set or queried using the SCPI commands described in "STATus Subsystem Command Descriptions" on page 109

Table 4-3 IEEE 488.2 Common Commands for Measurement Status Monitoring

Command or Query	Name	Function
*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.

Using 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:

Type	Method	Description
1	Polling	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.
2	Service Request (SRQ)	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 that 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).

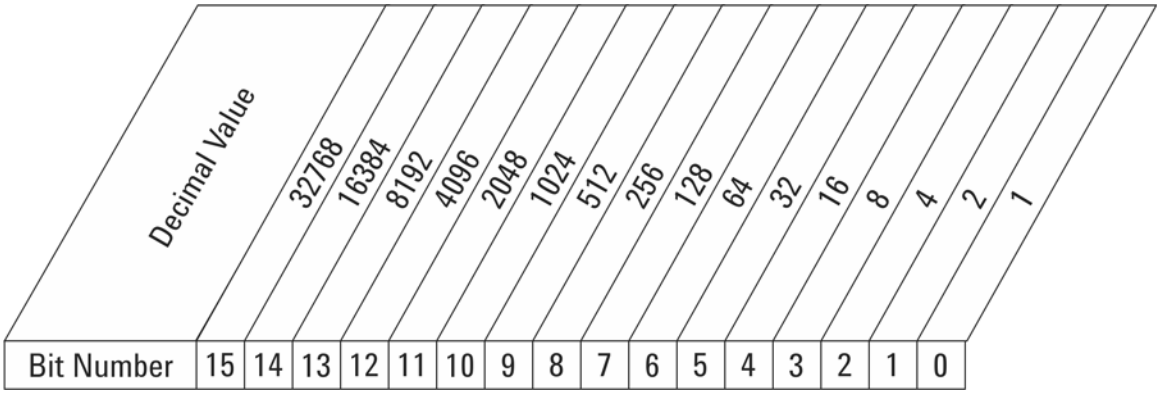
You can enable a particular bit(s), using the event enable register. The instrument will then monitor that particular condition(s). If the bit becomes true (0 to 1 transition) in the event register, it will stay set until the event register is cleared. Querying the event register allows you to detect 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 4-4 below. This number is sent with the command to enable a particular bit. If you want to enable more than one bit, you would send the sum of all the bits that you want to monitor.

Figure 4-4 Status Register Bit Values



(Note that Bit 15 is not used to report status.)

Examples:

1. To enable bit 0 and bit 6 of the 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?` query returns decimal value 140, then bit 7 is true, bit 3 is true, and bit 2 is true, because 140 = 128 + 8 + 4.

Monitoring a Condition in a Status Register

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.

Step	Actions
1	Clear all the status registers, by sending `*CLS`.
2	To monitor only Bit 10 events, instead of the default monitoring all the bits in the register, send `STAT:QUES:INT:ENAB 1024`. The register default is for positive transition events (0 to 1 transition), which show when an auto-trigger timeout occurs. Thus, if you want to know when the Auto-trigger timeout condition is **cleared**, send `STAT:QUES:INT:PTR 0` and then `STAT:QUES:INT:NTR 32767`.
3	Now, the only output from the Status Questionable Integrity register will be caused by a Bit 10 positive transition. That output feeds into the Integrity Sum Bit 9 of the Status Questionable register.
4	To monitor only Bit 9 of the Status Questionable Integrity register, send `STAT:QUES:ENAB 512`.
5	In its turn, the Status Questionable register output feeds into the “Status Questionable Summary” Bit 3 of the Status Byte Register. To enable the output from this bit of the Status Byte register, send `*SRE 8`.
6	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. When you monitor a condition with the SRQ method, you must:

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

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

Generating a Service Request

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

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

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

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

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

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

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

1. Set INITiate:CONTinuous off.
2. Set/enable the status registers.
3. Restart the measurement (send INIT).

Status Register System

The hardware status registers are combined to form the instrument status system. Specific status bits are assigned to monitor various aspects of the instrument operation and status. See Figure 4-2 on page 94 above for an overview of bit assignments and status register interconnections.

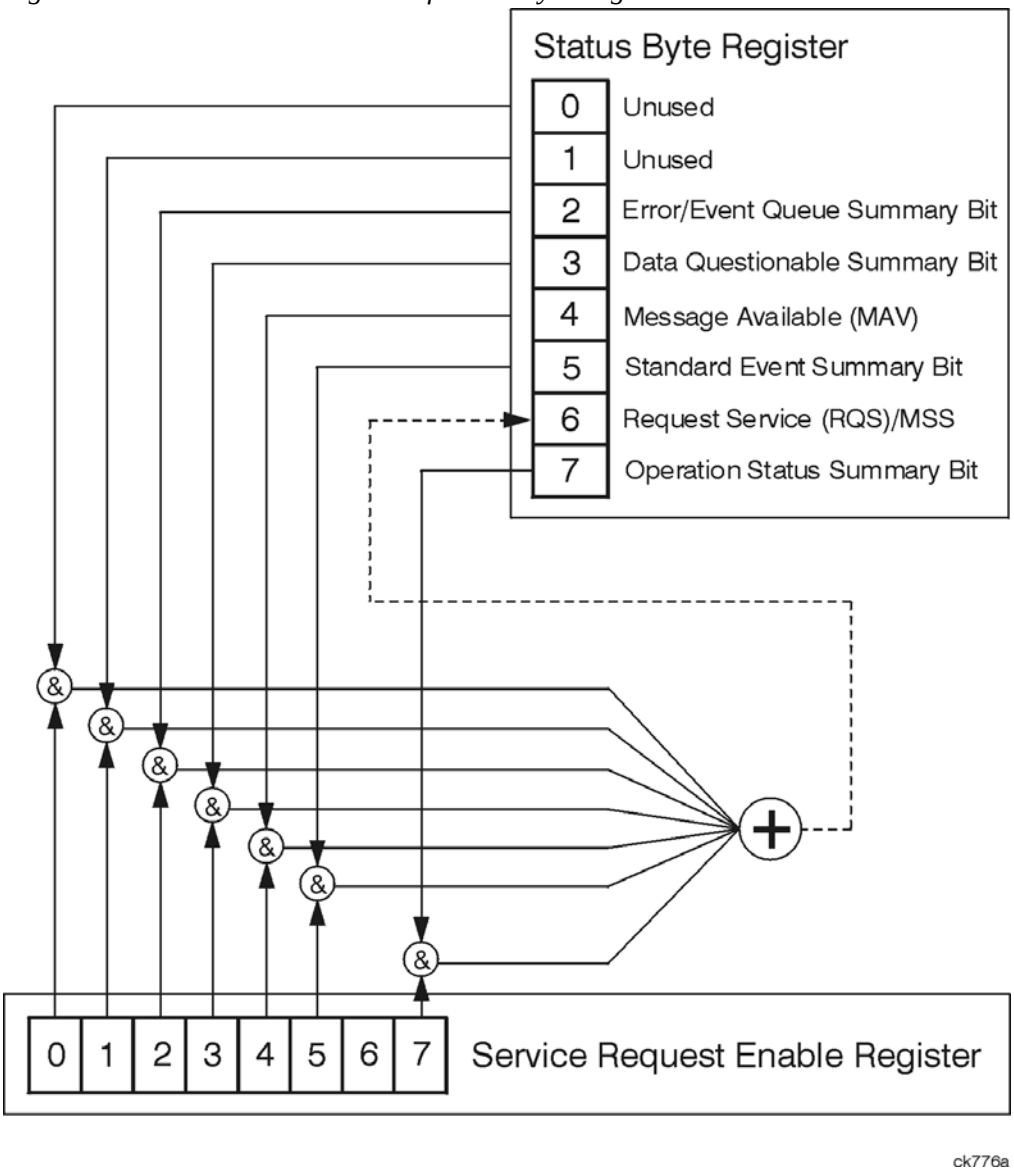
The status register system includes the following groups:

- "Status Byte Register" on page 102
- "Service Request Enable Register" on page 104
- "Standard Event Status Register" on page 105
- "Standard Event Status Enable Register" on page 106

- “Questionable Status Register” on page 108
- “Operation Register” on page 109

Status Byte Register

Figure 4-5 Connections of 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 the chapter *Device Status Reporting* of IEEE Standard 488.2–1992.

Table 4-4 Status Byte Register Bit Definitions

Input From	Bit	Name & Description
Operation Register	7	**Standard Operation Status Summary** 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.
Bitwise OR of enabled bits 0-5 and 7 of this register	6	**Request Service (RQS) Summary** 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).
Standard Event Status Register	5	**Standard Event Status Summary** 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.
	4	**Message Available (MAV)** 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.
Questionable Status Register	3	**Data Questionable Status Summary** 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.
	2	**Error/Event Queue Summary** 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.
	1	Unused (always set to 0)
	0	

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

The `*STB` command does **not** clear the status register.

Service Request Enable Register

In addition to the Status Byte Register, the status byte group also contains the Service Request Enable register. This 8-bit register lets you choose which bits in the Status Byte Register will trigger a service request.

To set this register, send `*SRE <integer>`, 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 query `*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 all zeros (0).

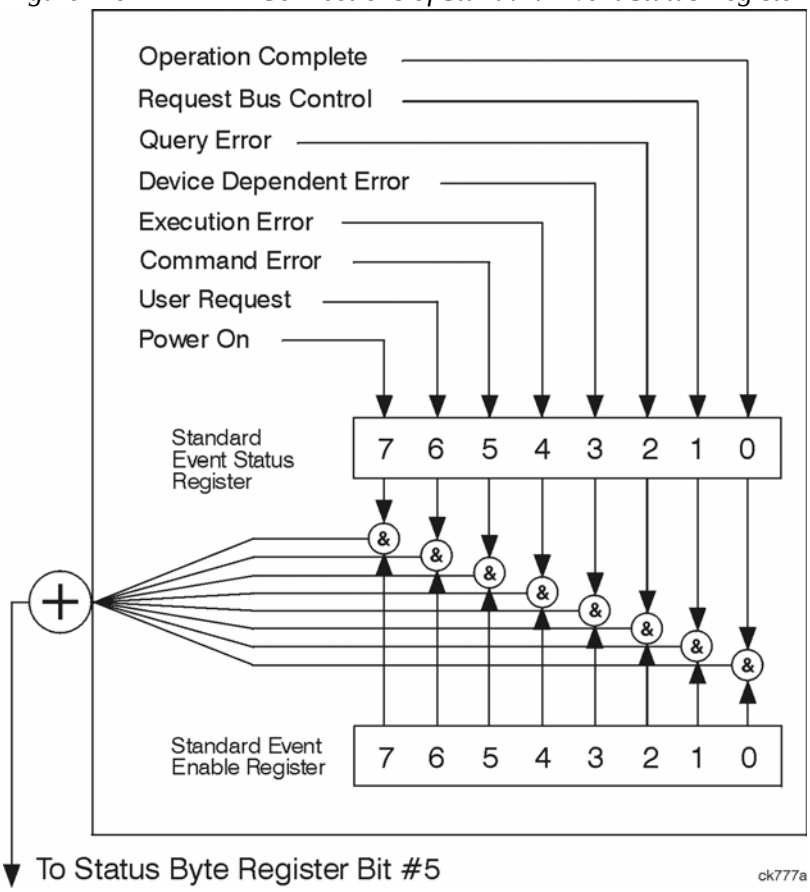
Table 4-5 Service Request Enable Register Bit Definitions

Bit	Name
7	**Standard Operation Status Summary Enable**
6	Unused (set to 1)
5	**Standard Event Status Summary Enable**
4	**Message Available (MAV) Enable**
3	**Data Questionable Status Summary Enable**
2	**Error/Event Queue Summary Enable**
1	Unused (set to 1)
0	Unused (set to 1)

Standard Event Status Register

The 8-bit Standard Event Status register is used to determine the specific events that set Bit 5 (Standard Event Status Summary) of the Status Byte Register.

Figure 4-6 Connections of Standard Event Status Register



The Standard Event Status register contains the following bits:

Table 4-6 Standard Event Status Register Bit Definitions

Bit	Name & Description
7	**Power On** A 1 in this bit position indicates that the instrument has been turned off and then on.
6	**User Request Key (Local)** 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.
5	**Command Error** A 1 in this bit position indicates that a command error has occurred. Command errors have SCPI error numbers from –199 to –100.

Table 4-6 Standard Event Status Register Bit Definitions

Bit	Name & Description
4	**Execution Error** A 1 in this bit position indicates that an execution error has occurred. Execution errors have SCPI error numbers from –299 to –200.
3	**Device Dependent Error** 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.
2	**Query Error** A 1 in this bit position indicates that a query error has occurred. Query errors have SCPI error numbers from –499 to –400.
1	**Request Control** This bit is for GPIB handshaking to request control. Currently it is set to 0 because there are no implementations where the analyzer controls another instrument.
0	**Operation Complete** A 1 in this bit position indicates that all pending operations were completed following execution of the `*OPC` command.

To query the Standard Event Status register, send `*ESR?`. The response is the decimal sum of the bits that are enabled (set to 1). For example, if bit number 7 and bit number 3 are enabled, the decimal sum is 136 (128 + 8), so the decimal value 136 is returned.

The output OR of the bits in this register, enabled by the settings of the Standard Event Status Enable Register, is fed to Bit 5 (Standard Event Status Summary) of the Status Byte Register.

Standard Event Status Enable Register

In addition to the Standard Event Status Register, the standard event status group also contains an 8-bit Standard Event Status Enable register. This register lets you choose which bits in the Standard Event Status Register will set the Standard Event Status Summary bit (5) of the Status Byte Register.

To set this register, send `*ESE <integer>`, where `<integer>` is the sum of the decimal values of the bits you want to enable. For example, to enable bit 7 and bit 6 so that whenever either of those bits is set to 1, the Standard Event Status Summary bit of the Status Byte Register will be set, send `*ESE 192` (192 = 128 + 64).

The query `*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 all zeros (0).

Table 4-7 Standard Event Status Enable Register Bit Definitions

Bit	Name
7	**Power On Enable**
6	**User Request Key (Local) Enable**
5	**Command Error Enable**
4	**Execution Error Enable**
3	**Device Dependent Error Enable**
2	**Query Error Enable**
1	**Request Control Enable**
0	**Operation Complete Enable**

Operation and Questionable Status Registers

The Operation Status Register and Questionable Status Register monitor the overall instrument condition. They are accessed with the `STATus:OPERation` and `STATus:QUEStionable` commands in the STATus command subsystem. See Figure 4-2 on page 94 above for an overview of status register interconnections.

Operation Status Register

The 16-bit Operation Status register monitors the current instrument measurement state. It checks to see whether the instrument is calibrating, sweeping, or waiting for a trigger. For more details, see the section **OPC, Operation Complete Command* in chapter 10 of IEEE Standard 488.2–1992.

Bit	Condition	Operation
15		
14		
13		
12		
11		
10		
9		
8	PAUSed	The instrument is paused (waiting) because you have pressed the **Pause** key or sent the `INITiate:PAUSe` command.
7		

Bit	Condition	Operation
6		
5	Waiting for TRIGger	The instrument is waiting for the trigger conditions to be met, then it will trigger a sweep or measurement.
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. This bit is valid for most X-Series Modes.
3	SWEeping	The instrument is busy taking a sweep.
2		
1		
0	CALibrating	The instrument is busy executing its Align Now process.

Questionable Status Register

The 16-bit Questionable Status register monitors the instrument's condition to see if anything questionable has occurred. These conditions include anything that might cause an error or an invalid measurement, such as a hardware problem, an out of calibration situation, or a unusual signal. All the bits of this register are summary bits from lower-level event registers.

Bit	Condition	Operation
15		Always 0
14		Reserved
13		Reserved
12		Reserved
11		Reserved
10		Reserved
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".
8	CALibration summary	The instrument has detected a hardware problem while doing the automatic internal alignment process.
7		Reserved
6		Reserved
5	FREQuency summary	The instrument hardware has detected an unlocked condition or a problem with the external frequency reference.

Bit	Condition	Operation
4	TEMPerature summary	The instrument is still warming up.
3	POWer summary	The instrument hardware has detected a power unleveled condition.
2		Reserved
1		Reserved
0		Reserved

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, that is, 0 to 32767 is equivalent to #H0 to #H7FFF.

Operation Register

The following commands and queries are available for this register:

- Operation Condition Query
- Operation Enable
- Operation Event Query
- Questionable Negative Transition
- Operation Positive Transition

Operation Condition 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
Initial S/W Revision	Prior to A.02.00

Operation Enable

Determines which bits in the Operation Event register, will set the Operation Status Summary bit (bit 7) in the Status Byte Register.

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

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

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

Operation Event Query

Returns the decimal value of the sum of the bits in the Operation Event register.

NOTE The register requires that the associated Positive Transition (PTR) or Negative Transition (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

Initial S/W Revision	Prior to A.02.00

Operation Negative Transition

Determines which bits in the Operation Condition register will set the corresponding bit in the Operation Event register when the condition register bit has a negative transition (1 to 0).

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

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

Operation Positive Transition

Determines which bits in the Operation Condition register will set the corresponding bit in the Operation Event register when the condition register bit has a positive transition (0 to 1).

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

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

Preset the Status Byte

Sets bits in most of the enable and transition registers to their default state. It presets all the Transition Filters, Enable Registers, and the Error/Event Queue Enable. It has no effect on Event Registers, Error/Event QUEue, IEEE 488.2 ESE, and SRE Registers, as described in IEEE Standard 488.2–1992.

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

Questionable Register

The following commands and queries are available for this register:

- Questionable Condition
- Questionable Enable
- Questionable Event Query
- Questionable Negative Transition
- Questionable Positive Transition

Questionable Condition

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
Initial S/W Revision	Prior to A.02.00

Questionable Enable

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 must be set to 1. The Status Byte 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 instrument.

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

Questionable Event Query

Returns the decimal value of the sum of the bits in the Questionable Event register.

NOTE The register requires that the associated Positive Transition (PTR) or Negative Transition (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

Initial S/W Revision	Prior to A.02.00

Questionable Negative Transition

Determines which bits in the Questionable Condition register will set the corresponding bit in the Questionable Event register when the condition register bit has a negative transition (1 to 0).

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

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

Questionable Positive Transition

Determines which bits in the Questionable Condition register will set the corresponding bit in the Questionable Event register when the condition register bit has a positive transition (0 to 1).

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

Mode	All
Remote Command	`:STATus:QUEStionable:PTRansition <integer>` `:STATus:QUEStionable:PTRansition?`
Example	STAT:QUES:PTR 16 Temperature summary ‘questionable asserted’ will be reported to the Status Byte Register.
Preset	32767
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767

Initial S/W Revision	Prior to A.02.00

Questionable Calibration Register

The following commands and queries are available for this register:

- Questionable Calibration Condition
- Questionable Calibration Enable
- Questionable Calibration Event Query
- Questionable Calibration Negative Transition
- Questionable Calibration Positive Transition

Questionable Calibration Condition

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
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Enable

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 (8) in the Questionable Register.

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

Mode	All
Remote Command	`:STATus:QUEStionable:CALibration:ENABle <integer>` `:STATus:QUEStionable:CALibration:ENABle?`
Example	STAT:QUES:CAL:ENAB 16384 Can be used to query if an alignment is needed, if you have turned off the automatic alignment process.

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

Questionable Calibration Event Query

Returns the decimal value of the sum of the bits in the Questionable Calibration Event register.

NOTE The register requires that the associated Positive Transition (PTR) or Negative Transition (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
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Negative Transition

Determines which bits in the Questionable Calibration Condition register will set the corresponding bit in the Questionable Calibration Event register when the condition register bit has a negative transition (1 to 0).

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

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

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

Questionable Calibration Positive Transition

Determines which bits in the Questionable Calibration Condition register will set the corresponding bit in the Questionable Calibration Event register when the condition register bit has a positive transition (0 to 1).

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

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

Questionable Calibration Skipped Register

The following commands and queries are available for this register:

- Questionable Calibration Skipped Condition
- Questionable Calibration Skipped Enable
- Questionable Calibration Skipped Event Query
- Questionable Calibration Skipped Negative Transition
- Questionable Calibration Skipped Positive Transition

Questionable Calibration Skipped Condition

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
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Skipped Enable

Determines which bits in the Questionable Calibration Skipped Condition Register will set bits in the Questionable Calibration Skipped Event register, which also sets bit 11 of the Questionable Calibration Register.

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

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

Questionable Calibration Skipped Event Query

Returns the decimal value of the sum of the bits in the Questionable Calibration Event register.

NOTE The register requires that the associated Positive Transition (PTR) or Negative Transition (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
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Skipped Negative Transition

Determines which bits in the Questionable Calibration Skipped Condition register will set the corresponding bit in the Questionable Calibration Skipped Event register when the condition register bit has a negative transition (1 to 0).

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

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

Questionable Calibration Skipped Positive Transition

Determines which bits in the Questionable Calibration Skipped Condition register will set the corresponding bit in the Questionable Calibration Skipped Event register when the condition register bit has a positive transition (0 to 1).

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

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

Questionable Calibration Extended Failure Register

The following commands and queries are available for this register:

- Questionable Calibration Extended Failure Condition
- Questionable Calibration Extended Failure Enable
- Questionable Calibration Extended Failure Event Query
- Questionable Calibration Extended Failure Negative Transition
- Questionable Calibration Extended Failure Positive Transition

Questionable Calibration Extended Failure Condition

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
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Failure Enable

Determines which bits in the Questionable Calibration Extended Failure Condition Register will set bits in the Questionable Calibration Extended Failure Event register, which also sets bit 9 of the Questionable Calibration Register.

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

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

Questionable Calibration Extended Failure Event 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 Positive Transition (PTR) or Negative Transition (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
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Failure Negative Transition

Determines which bits in the Questionable Calibration Extended Failure Condition register will set the corresponding bit in the Questionable Calibration Extended Failure Event register when the condition register bit has a negative transition (1 to 0).

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

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

Questionable Calibration Extended Failure Positive Transition

Determines which bits in the Questionable Calibration Extended Failure Condition register will set the corresponding bit in the Questionable Calibration Extended Failure Event register when the condition register bit has a positive transition (0 to 1).

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

Mode	All
Remote Command	`:STATus:QUEStionable:CALibration:EXTended:FAILure:PTRansition <integer>` `:STATus:QUEStionable:CALibration:EXTended:FAILure:PTRansition?`

Example	STAT:QUES:CAL:EXT:FAIL:PTR 1 EMI conducted align failure is required.
Preset	32767
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Needed Register

The following commands and queries are available for this register:

- Questionable Calibration Extended Needed Condition
- Questionable Calibration Extended Needed Enable
- Questionable Calibration Extended Needed Event Query
- Questionable Calibration Extended Needed Negative Transition
- Questionable Calibration Extended Needed Positive Transition

Questionable Calibration Extended Needed Condition

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
Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Needed Enable

Determines which bits in the Questionable Calibration Extended Needed Condition Register will set bits in the Questionable Calibration Extended Needed Event register, which also sets bit 14 of the Questionable Calibration Register.

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

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

Questionable Calibration Extended Needed Event 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 Positive Transition (PTR) or Negative Transition (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

Initial S/W Revision	Prior to A.02.00

Questionable Calibration Extended Needed Negative Transition

Determines which bits in the Questionable Calibration Extended Needed Condition register will set the corresponding bit in the Questionable Calibration Extended Needed Event register when the condition register bit has a negative transition (1 to 0).

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

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

Questionable Calibration Extended Needed Positive Transition

Determines which bits in the Questionable Calibration Extended Needed Condition register will set the corresponding bit in the Questionable Calibration Extended Needed Event register when the condition register bit has a positive transition (0 to 1).

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

Mode	All
Remote Command	`:STATus:QUEStionable:CALibration:EXTended:NEEDed:PTRansition <integer>` `:STATus:QUEStionable:CALibration:EXTended:NEEDed:PTRansition?`
Example	STAT:QUES:CAL:EXT:NEED:PTR 2 Align EMI conducted is required.
Preset	32767

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

Questionable Frequency Register

The following commands and queries are available for this register:

- Questionable Frequency Condition
- Questionable Frequency Enable
- Questionable Frequency Event Query
- Questionable Frequency Negative Transition
- Questionable Frequency Positive Transition

Questionable Frequency Condition

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
Initial S/W Revision	Prior to A.02.00

Questionable Frequency Enable

Determines which bits in the Questionable Frequency Condition Register will set bits in the Questionable Frequency Event register, which also sets the Frequency Summary bit (bit 5) in the Questionable Register.

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

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

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

Questionable Frequency Event Query

Returns the decimal value of the sum of the bits in the Questionable Frequency Event register.

NOTE The register requires that the associated Positive Transition (PTR) or Negative Transition (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
Initial S/W Revision	Prior to A.02.00

Questionable Frequency Negative Transition

Determines which bits in the Questionable Frequency Condition register will set the corresponding bit in the Questionable Frequency Event register when the condition register bit has a negative transition (1 to 0).

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

Mode	All
Remote Command	`:STATus:QUEStionable:FREQuency:NTRansition <integer>` `:STATus:QUEStionable:FREQuency:NTRansition?`

Example	STAT:QUES:FREQ:NTR 2 Frequency Reference ‘regained lock’ will be reported to the Frequency Summary of the Status Questionable register.
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Initial S/W Revision	Prior to A.02.00

Questionable Frequency Positive Transition

Determines which bits in the Questionable Frequency Condition register will set the corresponding bit in the Questionable Frequency Event register when the condition register bit has a positive transition (0 to 1).

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

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

Questionable Integrity Register

The following commands and queries are available for this register:

- Questionable Integrity Condition
- Questionable Integrity Enable
- Questionable Integrity Event Query
- Questionable Integrity Negative Transition

- Questionable Integrity Positive Transition

Questionable Integrity Condition

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
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Enable

Determines which bits in the Questionable Integrity Condition Register will set bits in the Questionable Integrity Event register, which also sets the Integrity Summary bit (bit 9) in the Questionable Register.

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

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

Questionable Integrity Event Query

Returns the decimal value of the sum of the bits in the Questionable Integrity Event register.

NOTE The register requires that the associated Positive Transition (PTR) or Negative Transition (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
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Negative Transition

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

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

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

Questionable Integrity Positive Transition

Determines which bits in the Questionable Integrity Condition register will set the corresponding bit in the Questionable Integrity Event register when the condition register bit has a positive transition (0 to 1).

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

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

Questionable Integrity Signal Register

The following commands and queries are available for this register:

- Questionable Integrity Signal Condition
- Questionable Integrity Signal Enable
- Questionable Integrity Signal Event Query
- Questionable Integrity Signal Negative Transition
- Questionable Integrity Signal Positive Transition

Questionable Integrity Signal Condition

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

Initial S/W Revision	Prior to A.02.00

Questionable Integrity Signal Enable

Determines which bits in the Questionable Integrity Signal Condition Register will set bits in the Questionable Integrity Signal Event register, which also sets the Integrity Summary bit (bit 9) in the Questionable Register.

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

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

Questionable Integrity Signal Event 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 Positive Transition (PTR) or Negative Transition (NTR) filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	`:STATus:QUEStionable:INTegrity:SIGNal[:EVENt]?`
Example	STAT:QUES:INT:SIGN?
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command

Initial S/W Revision	Prior to A.02.00

Questionable Integrity Signal Negative Transition

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

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

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

Questionable Integrity Signal Positive Transition

Determines which bits in the Questionable Integrity Signal Condition register will set the corresponding bit in the Questionable Integrity Signal Event register when the condition register bit has a positive transition (0 to 1).

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

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

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

Questionable Integrity Uncalibrated Register

The following commands and queries are available for this register:

- Questionable Integrity Uncalibrated Condition
- Questionable Integrity Uncalibrated Enable
- Questionable Integrity Uncalibrated Event Query
- Questionable Integrity Uncalibrated Negative Transition
- Questionable Integrity Uncalibrated Positive Transition

Questionable Integrity Uncalibrated Condition

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
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Uncalibrated Enable

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

Questionable Integrity Uncalibrated Event 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 Positive Transition (PTR) or Negative Transition (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
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Uncalibrated Negative Transition

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

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

Mode	All
Remote Command	:STATus:QUEStionable:INTegrity:UNCalibrated:NTRansition <integer> :STATus:QUEStionable:INTegrity:UNCalibrated:NTRansition?
Example	STAT:QUES:INT:UNC:NTR 1 Oversweep cleared will be reported to the Integrity Summary of the Status Questionable register.
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Initial S/W Revision	Prior to A.02.00

Questionable Integrity Uncalibrated Positive Transition

Determines which bits in the Questionable Integrity Uncalibrated Condition register will set the corresponding bit in the Questionable Integrity Uncalibrated Event register when the condition register bit has a positive transition (0 to 1).

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

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

Questionable Power Register

The following commands and queries are available for this register:

- Questionable Power Condition
- Questionable Power Enable
- Questionable Power Event Query
- Questionable Power Negative Transition
- Questionable Power Positive Transition

Questionable Power Condition

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
Initial S/W Revision	Prior to A.02.00

Questionable Power Enable

Determines which bits in the Questionable Power Condition Register will set bits in the Questionable Power Event register, which also sets the Power Summary bit (bit 3) in the Questionable Register.

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

Mode	All
Remote Command	`:STATus:QUEStionable:POWer:ENABle <integer>` `:STATus:QUEStionable:POWer:ENABle?`
Example	STAT:QUES:POW:ENAB 32 50 MHz Input Pwr too High for Cal will be reported to the Power Summary of the Status Questionable register.
Preset	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Min	0
Max	32767
Initial S/W Revision	Prior to A.02.00

Questionable Power Event Query

Returns the decimal value of the sum of the bits in the Questionable Power Event register.

NOTE The register requires that the associated Positive Transition (PTR) or Negative Transition (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
Initial S/W Revision	Prior to A.02.00

Questionable Power Negative Transition

Determines which bits in the Questionable Power Condition register will set the corresponding bit in the Questionable Power Event register when the condition register bit has a negative transition (1 to 0).

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

Mode	All
Remote Command	`:STATus:QUEStionable:POWer:NTRansition <integer>` `:STATus:QUEStionable:POWer:NTRansition?`
Example	STAT:QUES:POW:NTR 32 50 MHz Input Power became OK for Cal will be reported to the Power Summary of the Status Questionable register.
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0

Max	32767
Initial S/W Revision	Prior to A.02.00

Questionable Power Positive Transition

Determines which bits in the Questionable Power Condition register will set the corresponding bit in the Questionable Power Event register when the condition register bit has a positive transition (0 to 1).

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

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

Questionable Temperature Register

The following commands and queries are available for this register:

- Questionable Temperature Condition
- Questionable Temperature Enable
- Questionable Temperature Event Query
- Questionable Temperature Negative Transition
- Questionable Temperature Positive Transition

Questionable Temperature Condition

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
Initial S/W Revision	Prior to A.02.00

Questionable Temperature Enable

Determines which bits in the Questionable Temperature Condition Register will set bits in the Questionable Temperature Event register, which also sets the Temperature Summary bit (bit 4) in the Questionable Register.

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

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

Questionable Temperature Event Query

Returns the decimal value of the sum of the bits in the Questionable Temperature Event register.

NOTE The register requires that the associated Positive Transition (PTR) or Negative Transition (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
Initial S/W Revision	Prior to A.02.00

Questionable Temperature Negative Transition

Determines which bits in the Questionable Temperature Condition register will set the corresponding bit in the Questionable Temperature Event register when the condition register bit has a negative transition (1 to 0).

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

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

Questionable Temperature Positive Transition

Determines which bits in the Questionable Temperature Condition register will set the corresponding bit in the Questionable Temperature Event register when the condition register bit has a positive transition (0 to 1).

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

Mode	All
Remote Command	`:STATus:QUEStionable:TEMPerature:PTRansition <integer>` `:STATus:QUEStionable:TEMPerature:PTRansition?`

Example	STAT:QUES:TEMP:PTR 1 Reference Oscillator Oven became cold will be reported to the Temperature Summary of the Status Questionable register.
Preset	32767
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Initial S/W Revision	Prior to A.02.00

5 Combined W-CDMA Measurement

This topic provides an overview of this measurement, and includes the following subsections:

"Remote Commands for Combined W-CDMA" on page 143

"Remote SCPI Results for Combined W-CDMA" on page 144

Combined W-CDMA is a special measurement for manufacturing of W-CDMA devices. The aim of this measurement is to optimize measurement speed. Some measurements are combined into a single package to prevent time-consuming measurement switching. In addition to this, ACP can be measured simultaneously with EVM measurements.

Currently, the following measurements are supported:

- Modulation Accuracy (Rho)
- QPSK EVM
- Adjacent Channel Power (ACP)

For more information on measurement setup, see "Parameter List (View)" on page 240.

Remote Commands for Combined W-CDMA

The following commands and queries can be used to retrieve the measurement results:

```
:CONFigure:CWCDma
:CONFigure:CWCDma:NDEFault
:FETCh:CWCDma[n]?
:INITiate:CWCDma
:MEASure:CWCDma[n]?
:READ:CWCDma[n]?
```

Remote SCPI Results for Combined W-CDMA

For the queries listed above, the results returned depend on the value of **n**, as follows.

n	Results Returned
0	Returns unprocessed I/Q trace data of Capture Interval, as a series of trace point values. In each pair, the I-values are listed first using the 0 through even-indexed values. The Q values are the odd-indexed values.

n	Results Returned
1 (or not specified)	Returns scalar results. Total results length and the returned values depend on the number of enabled frequencies and Result Selection. Results are returned only for enabled frequencies, so the length is reduced if some results are disabled. Note that the condition where no result is set to invisible and multiple frequencies are enabled is assumed here. Scalar results consist of the following blocks: 1. Rho (or QPSK EVM) results for Frequency 1 2. ACP results for Frequency 1 3. Rho (or QPSK EVM) results for Frequency 2 4. ACP results for Frequency 2 5. Rho (or QPSK EVM) results for Frequency 3 … The content of each results block is as follows. **Rho results block** consists of the following values, where the first index of the block is denoted by (R): • (R). **RMS EVM** is a floating point number (in percent) of EVM • (R)+1. **Peak EVM** is a floating point number (in percent) of the peak EVM • (R)+2. **Magnitude error** is a floating point number (in percent) of the average magnitude error • (R)+3. **Phase error** is a floating point number (in degree) of the average phase error • (R)+4. **I/Q origin offset** is a floating point number (in dB) of the I and Q error (magnitude squared) offset from the origin • (R)+5. **Frequency error** is a floating point number (in Hz) of the frequency error in the measured signal • (R)+6. **Rho** is a floating point number of Rho • (R)+7. **Peak Code Domain Error** is a floating point number (in dB) of the Peak Code Domain Error relative to the mean power • (R)+8. **Peak Code Domain Error Channel Number** is the channel number in which the peak code domain error is detected. • (R)+9. **Number of active channels** • (R)+10. **Time offset** is a floating point number (in chips) of the pilot phase timing from the acquisition trigger point. • (R)+11. **CPICH power over a slot** is a floating point number (in dB) of the CPICH power over a measurement slot. In the MS mode, the value returned is –999.

n	Results Returned
1 (or not specified)	• (R)+12. **Total power over a slot** is a floating point number (in dBm) of the total RF power over a measurement slot.
(continued)	• (R)+13. **First Slot Number** is an integer number of the first slot in Capture Interval. This is not averaged even if the averaging function is On. It is always the last cycle of the measurement. • (R)+14. **DPCCH Slot Format**: (floating) If Sync Type is DPCCH, the DPCCH slot format value used for synchronization is returned. 0.0: Slot Format 0 1.0: Slot Format 1 2.0: Slot Format 2 3.0: Slot Format 3 4.0: Slot Format 4 5.0: Slot Format 5 - If Sync Type is PRACH, the value returned is –999.0. - In BTS mode, the value returned is –999.0. • (R)+15. **Preamble Signature**: (floating) • BTS mode — The returned value is always –999.0. • MS mode — In Preamble Signature auto-detection mode, the detected signature code number (from 0.0 to 15.0) is returned when the Sync Type is PRACH Message. — In Preamble Signature manual setting mode, the retuned value is the same as the parameter setting. When the Sync Type is not PRACH Message, the returned value is –999.0. • (R)+16. **I Offset** is a floating point number (in V) of the I offset. • (R)+17. **Q Offset** is a floating point number (in V) of the Q offset.

n	Results Returned
1 (or not specified) (continued)	**QPSK EVM results block** consists of the following values, where the first index of the block is denoted by (Q): • (Q). **RMS EVM** is a floating point number (in percent) of EVM. • (Q)+1. **Peak EVM** is a floating point number (in percent) of peak EVM. • (Q)+2. **Magnitude Error** is a floating point number (in percent) of magnitude error. • (Q)+3. **Phase Error** is a floating point number (in degrees) of phase error. • (Q)+4. **Frequency Error** is a floating point number (in Hz) of the frequency error in the measured signal. • (Q)+5. **I/Q Origin Offset** is a floating point number (in dB) of the I and Q error (magnitude squared) offset from the origin. **ACP results block** consists of the following values, where the first index of the block is denoted by (A): • (A). **Carrier Power** (dBm) • (A)+1. **Lower Offset Relative Power** (dB) • (A)+2. **Lower Offset Absolute Power** (dBm) • (A)+3. **Upper Offset Relative Power** (dB) • (A)+4. **Upper Offset Absolute Power** (dBm)

n	Results Returned
2	Returns information about scalar results (n = 1). Total results length and the returned values depend on the number of enabled frequencies. Information only for enabled frequencies is returned. 0. Number of Enabled Frequencies 1. First Index of Index List for Frequency 1 (zero-based) 2. First Index of Index List for Frequency 2 (zero-based) … Each Index List consists of the following values, where the first index of the block is denoted by (F): • (F). First Index of Rho results in scalar results (zero-based) • (F)+1. First Index of QPSK EVM results in scalar results (zero-based) • (F)+2. First Index of ACP results in scalar results (zero-based) If there are no results for the measurement, –999 is returned as index. For example, "2, 3, 6, 0, –999, 15, 18, –999, 33" means: • 2: There are 2 enabled frequencies. • 3: Index List block for Frequency 1 starts at index 3 in this list. • 6: Index List block for Frequency 2 starts at index 6 in this list. • 0: Rho results for Frequency 1 start at index 0 in scalar results (n = 1). • –999: There is no QPSK EVM result for Frequency 1 in scalar results (n = 1). • 15: ACP results for Frequency 1 start at index 15 in scalar results (n = 1). • 18: Rho results for Frequency 2 start at index 18 in scalar results (n = 1). • –999: There is no QPSK EVM result for Frequency 2 in scalar results (n = 1). • 33: ACP results for Frequency 2 start at index 33 in scalar results (n = 1).

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

Amplitude (AMPTD) Y Scale

There is no functionality unique to this measurement.

For details, see the “AMPTD Y Scale” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path **Front-panel key**

Attenuation

This menu controls both the electrical and mechanical attenuators and their interactions. The value read back on the key in square brackets is the current Total (Elec + Mech) attenuation. When in Pre-Adjust for Min Clip mode, this value can change at the start of every measurement.

For details, see “Attenuation” under the “AMPTD Y Scale” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path **AMPTD Y Scale**

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker.

For details, see “Presel Center” under the “AMPTD Y Scale” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path **AMPTD Y Scale**

Presel Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response for the signal of interest. This function is only available when Presel Center is available

For details, see “Presel Adjust” under the “AMPTD Y Scale” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path **AMPTD Y Scale**

Internal Preamp

This menu controls the internal preamplifier. Turning Internal Preamp on gives a better noise figure, but a poorer inter-modulation distortion (TOI) to noise floor dynamic range. You can optimize this setting for your particular measurement.

For details, see “Internal Preamp” under the “AMPTD Y Scale” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path **AMPTD Y Scale**

BW

There are no keys available in BW menu, so, when pressed, this key displays a blank menu.

Key Path	**Front-panel key**

Cont (Continuous Measurement/Sweep)

Operation of this key is identical across all measurements.

For details, see the “Cont” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

FREQ Channel

Operation of this key is identical across all measurements.

For details, see the “FREQ Channel” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

Input/Output

Operation of this key is identical across all measurements.

For details, see the “Input/Output” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

Marker

For this measurement, there are no keys available in the Marker menu. When pressed, this key displays a blank menu.

Key Path	**Front-panel key**

Marker Function

There are no menu keys available in Marker Function menu, so, when pressed, this key displays a blank menu.

Key Path	**Front-panel key**

Marker To

There are no menu keys available under this menu, so, when pressed, this key displays a blank menu.

Key Path	**Front-panel key**

Meas

Operation of this key is identical across all measurements.

For details, see the “Meas” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

Meas Setup

There are no keys available under this menu: the menu is blank.

All measurement parameters are selected using SCPI, or via the parameter setup table.

For more information about the parameter setup table, see "Parameter List (View)" on page 240. Other functionality described in this section is available via remote commands only.

Key Path	**Front-panel key**

RRC Filter Control (Remote Command Only)

Allows you to change the status (ON/OFF) of the Root Raised Cosine (RRC) filter. An ON/OFF state change will require a measurement restart.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:FILTer[:RRC][:STATe] OFF|ON|0|1` `[:SENSe]:CWCDma:FILTer[:RRC][:STATe]?`
Example	CWCD:FILT ON CWCD:FILT?
Preset	ON
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Filter Alpha (Remote Command Only)

Specifies the alpha value of the Root Raised Cosine (RRC) filter.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:FILTer[:RRC]:ALPHa <real>` `[:SENSe]:CWCDma:FILTer[:RRC]:ALPHa?`
Example	CWCD:FILT:ALPH 0.3 CWCD:FILT:ALPH?
Preset	0.22
State Saved	Saved in instrument state.
Min	0.01
Max	0.50
Initial S/W Revision	Prior to A.02.00

IF Gain Commands

Enables you to control an internally switched IF amplifier with approximately 10 dB of gain. Using this amplifier allows you to take full advantage of the RF dynamic range of the instrument. When the amplifier can be turned on without an overload, the dynamic range is always better when the amplifier is set to On, than when it is set to Off. The IF Gain can be used to set the IF Gain function to Auto, On (additional 10 dB), or Off. These settings affect sensitivity and IF overloads.

IF Gain Auto (Remote Command Only)

IF Gain State (Remote Command Only)

IF Gain Auto (Remote Command Only)

Activates the auto rules for IF Gain.

Remote Command	`[:SENSe]:CWCDma:IF:GAIN:AUTO[:STATe] OFF|ON|0|1` `[:SENSe]:CWCDma:IF:GAIN:AUTO[:STATe]?`
Example	CWCD`:IF:GAIN:AUTO OFF` CWCD`:IF:GAIN:AUTO?`
Couplings	The IF Gain setting is changed according to the following rule when either the auto attenuation (for example, the electrical attenuator) or optimize mechanical attenuator range is requested: ‘Auto’ sets IF Gain to ‘High Gain’ under any of the following conditions: the input attenuator is set to 0 dB, the preamp is turned on, or the Max Mixer Level is 20 dBm or lower. For other settings, ‘Auto’ sets IF Gain to ‘Low Gain’.
Preset	OFF
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

IF Gain State (Remote Command Only)

Selects the range of the IF gain.

Remote Command	`[:SENSe]:CWCDma:IF:GAIN[:STATe] ON|OFF|1|0` `[:SENSe]:CWCDma:IF:GAIN[:STATe]?`
Example	CWCD:`IF:GAIN OFF` CWCD:`IF:GAIN?`
Notes	ON = high gain OFF = low gain

Couplings	When either the auto attenuation works (for example, with the electrical attenuator) or optimize mechanical attenuator range is requested, the IF Gain setting is changed according to the following rule. 'Auto' sets IF Gain to 'High Gain' under any of the following conditions: the input attenuator is set to 0 dB, the preamp is turned on, or the Max Mixer Level is 20 dBm or lower. For other settings, 'Auto" sets IF Gain to 'Low Gain'.
Preset	OFF
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Capture Setup

There is currently only one command in this group:

Step Capture Interval (Remote Command Only)

Step Capture Interval (Remote Command Only)

Sets capture time of a step.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:CAPTure[:TIME] <time>` `[:SENSe]:CWCDma:CAPTure[:TIME]?`
Example	CWCD:CAPT 5ms CWCD:CAPT?
Notes	The following condition must be met for all enabled measurements: (Calculation Length) + (Calculation Offset) <= (Step Capture Interval) Any value lower than (Calculation Length) + (Calculation Offset) is clipped to (Calculation Length) + (Calculation Offset). When Calculation Length or Calculation Offset is increased, this parameter is adjusted only if the condition is not met.
Preset	5ms
State Saved	Saved in instrument state.
Min	9.10230e–05
Max	0.1
Initial S/W Revision	Prior to A.02.00

Gate Setup

Gate Source (Remote Command Only)

Sets gate source type. If set to IMMediate, the next capture starts immediately after the gate recovery time is elapsed. If not, capture starts after gate condition to be met after gate recovery time is elapsed.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:GATE:SOURce IMMediate|EXTernal1|EXTernal2|RFBurst|FRAMe` `[:SENSe]:CWCDma:GATE:SOURce?`
Example	CWCD:GATE:SOUR RFB CWCD:GATE:SOUR?
Preset	IMMediate
State Saved	Saved in instrument state.
Range	Immediate|Video|External1|External2|RF Burst|Frame
Initial S/W Revision	Prior to A.02.00

Gate Recovery Time (Remote Command Only)

Sets gate recovery time. After frequency hopping, it is necessary to wait for waveform stabilization.

Remote Command	`[:SENSe]:CWCDma:GATE:RTIMe <time>` `[:SENSe]:CWCDma:GATE:RTIMe?`
Example	CWCD:GATE:RTIM 500e–6 CWCD:GATE:RTIM?
Preset	1ms
State Saved	Saved in instrument state.
Min	1us
Max	10ms
Initial S/W Revision	Prior to A.02.00

Frequency List Setup

Frequency List (Remote Command Only)

State List (Remote Command Only)

Frequency List (Remote Command Only)

Sets list of frequencies to be measured.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:LIST:FREQuency <freq>, …` `[:SENSe]:CWCDma:LIST:FREQuency`
Example	CWCD:LIST:FREQ 900e6,1.0e9,1.1e9,0,0,0,0,0,0,0,0,0 CWCD:LIST:FREQ?
Notes	The length of returned list is fixed at 12, but a shorter list is acceptable. If the number of received items is less than 12, unsent values are not changed. The Center Frequency setting under Freq/Channel front panel key or [:SENSe]:FREQuency:CENTer overwrites the first frequency in this list. CAUTION: When list acquisition is performed, the maximum frequency is 3.6GHz even if all frequencies in the list are the same. When only the first list is used (see [:SENSe]:CWCDma:LIST:STATe), there is no limitation.
Preset	1.0e9,1.0e9,1.0e9,1.0e9,1.0e9,1.0e9,1.0e9,1.0e9,1.0e9,1.0e9,1.0e9,1.0e9
State Saved	Saved in instrument state.
Min	–79.999995 MHz
Max	Hardware Dependent: Same as Center Frequency
Initial S/W Revision	Prior to A.02.00

State List (Remote Command Only)

Sets list of states. If the state of the element is false, the element is skipped.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:LIST:STATe ON|OFF|1|0, …` `[:SENSe]:CWCDma:LIST:STATe`
Example	CWCD:LIST:STAT 1,1,0,0,0,0,0,0,0,0,0,0 CWCD:LIST:STAT?

Notes	The length of the returned list is fixed at 12, but a shorter list is acceptable. If the number of received items is less than 12, unsent values are not changed. The first element is fixed at ON.
Preset	1,0,0,0,0,0,0,0,0,0,0,0
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Rho Related Setting Commands

The following commands and settings relate to the measurement of Modulation Accuracy (Rho):

“Measurement Enable/Disable (Remote Command Only)” on page 165
“Rho Calculation Length (Remote Command Only)” on page 165
“Rho Calculation Offset (Remote Command Only)” on page 165
“Rho Result Selection (Remote Command Only)” on page 166
“Sync Type” on page 166
“Primary Scramble Code [BTS only] (Remote Command Only)” on page 169
“Slot Format [MS only] (Remote Command Only)” on page 170
“Preamble Signature [MS only] (Remote Command Only)” on page 171
“Scramble Code Offset [BTS only] (Remote Command Only)” on page 172
“Scramble Code [MS only] (Remote Command Only)” on page 173
“Scramble Code Type [BTS only] (Remote Command Only)” on page 173
“Symbol Boundary [BTS only] (Remote Command Only)” on page 174
“Symbol Boundary MS [MS only] (Remote Command Only)” on page 200
“Sync Start Slot (Remote Command Only)” on page 213
“Transient Period Exclude (Remote Command Only)” on page 214
“Spectrum (Remote Command Only)” on page 214
“EVM Result I/Q Offset (Remote Command Only)” on page 214
“Active Set Threshold (Remote Command Only)” on page 215
“Chip Rate (Remote Command Only)” on page 216
“DTX/Burst Detect (Remote Command Only)” on page 216
“PICH Code Number (Remote Command Only)” on page 217
“MICH Code Number [BTS only] (Remote Command Only)” on page 218
“Timing Estimation (Remote Command Only)” on page 218

"Multi Channel Estimator (Remote Command Only)" on page 219

"Frequency Error Tolerance Range (Remote Command Only)" on page 219

Measurement Enable/Disable (Remote Command Only)

Allows you to enable or disable the Rho measurement.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO[:ENABle] OFF|ON|0|1` `[:SENSe]:CWCDma:RHO[:ENABle]?`
Example	CWCD:RHO OFF CWCD:RHO?
Preset	ON
State Saved	Saved in instrument state.
Range	On|Off
Initial S/W Revision	Prior to A.02.00

Rho Calculation Length (Remote Command Only)

Sets the calculation length of the Rho measurement.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SWEep:LENGth <time>` `[:SENSe]:CWCDma:RHO:SWEep:LENGth?`
Example	CWCD:RHO:SWE:LENG 5ms CWCD:RHO:SWE:LENG?
Preset	3.383334ms
State Saved	Saved in instrument state.
Min	3.383334ms
Max	22.716667ms
Initial S/W Revision	Prior to A.02.00

Rho Calculation Offset (Remote Command Only)

Sets the calculation offset of a Rho measurement. The accuracy of the first part of a step can be affected by measurement frequency hopping. Specified length of the first portion is discarded if non-zero value is set.

Mode	WCDMA

Remote Command	`[:SENSe]:CWCDma:RHO:SWEep:OFFSet <time>` `[:SENSe]:CWCDma:RHO:SWEep:OFFSet?`
Example	CWCD:RHO:SWE:OFFS 100us CWCD:RHO:SWE:OFFS?
Preset	0.0
State Saved	Saved in instrument state.
Min	0.0
Max	18.838866ms
Initial S/W Revision	Prior to A.02.00

Rho Result Selection (Remote Command Only)

Sets the composition of Rho result block in scalar results. If an item is disabled (off), the item is not shown and is not contained in remote results.

The number and the order of this list correspond to Rho result block in remote result (n = 1).

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:RESult ON|OFF|0|1, …` `[:SENSe]:CWCDma:RHO:RESult?`
Example	CWCD:RHO:RES 1,0,0,0,0,0,0,0,0,0,0,0,0,0,0 CWCD:RHO:RES?
Preset	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Sync Type

Enables you to select the synchronization channel for use. The available functionality depends on the current setting of **Radio Device** (BTS or MS). See:

“Sync Type [BTS only] (Remote Command Only)” on page 166

“Sync Type [MS only] (Remote Command Only)” on page 169

Sync Type [BTS only] (Remote Command Only)

Enables you to select the channel to synchronize with, and to set features, such as Symbol Rate, that may affect synchronization. You can select from the following types of channels and features listed in the menu:

- CPICH - Synchronize with the common pilot channel (CPICH).

- SCH - Synchronize with the synchronization channel (SCH).
- Symbol Based - Allows you to access the menu that allows you to select the code symbol to synchronize with.
- Symbol Rate - Allows you to set the symbol rate, ranging from 7.5 to 960 ksps. The parameter automatically sets the maximum value for Code Number when appropriate.
- Code Number - Allows you to set the code number. The range is 0 to 511, depending on the Symbol Rate setting.
- Antenna–2 CPICH - Allows you to synchronize with the STTD Antenna–2 common pilot channel.
- STTD Diff - Allows you to synchronize to the common pilot channel at STTD antenna–1 and antenna–2 to make Diversity Time Error measurements.
- TSTD SCH Antenna1 – Allows you to synchronize the antenna1 of TSTD SCH.
- TSTD SCH Antenna2 – Allows you to synchronize the antenna2 of TSTD SCH.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SYNC[:BTS] CPICh|SCH|SYMBol|STTD|A2CPich|A1SCh|A2SCh` `[:SENSe]:CWCDma:RHO:SYNC[:BTS]?`
Example	CWCD:RHO:SYNC SCH CWCD:RHO:SYNC?
Notes	This command is effective when [:SENSe]:RADio:DEVice is set to BTS.
Couplings	The SYMBol selection is synchronized to the code symbol specified by [:SENSe]:CWCD:RHO:SYNC:SYMBol:SRATe and [:SENSe]:CWCD:RHO:SYNC:SYMBol:SPRead.
Preset	CPICh
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Synchronization Symbol Rate [BTS only] (Remote Command Only)

Sets the symbol rate of the code symbol to synchronize with. The parameter automatically sets the maximum value for the Code Number when appropriate.

This command is currently available only for BTS.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SYNC:SYMBol:SRATe <integer>` `[:SENSe]:CWCDma:RHO:SYNC:SYMBol:SRATe?`

Example	CWCD:RHO:SYNC:SYMB:SRAT 15000 CWCD:RHO:SYNC:SYMB:SRAT?
Notes	This command is effective when [:SENSe]:RADio:DEVice is set to BTS, and [:SENSe]:CWCD:RHO:SYNC[:BTS] is set to SYMBol.
Preset	7500
State Saved	Saved in instrument state.
Range	7500|15000|30000|60000|120000|240000|480000|960000
Initial S/W Revision	Prior to A.02.00

Synchronization Code Number [BTS only] (Remote Command Only)

Sets the spread code number of the code symbol to synchronize with. The range depends on the Symbol Rate setting.

This command is available only for BTS.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SYNC:SYMBol:SPRead <integer>` `[:SENSe]:CWCDma:RHO:SYNC:SYMBol:SPRead?`
Example	CWCD:RHO:SYNC:SYMB:SPR 3 CWCD:RHO:SYNC:SYMB:SPR?
Notes	This command is effective when [:SENSe]:RADio:DEVice is set to BTS, and [:SENSe]:CWCDma:RHO:SYNC[:BTS] is set to SYMBol.
Couplings	See Notes
Preset	1
State Saved	Saved in instrument state.
Min	0
Max	511, when [:SENSe]:CWCDma:RHO:SYNC:SYMBol:SRATe =7500 255, when [:SENSe]:CWCDma:RHO:SYNC:SYMBol:SRATe =15000 127, when [:SENSe]:CWCDma:RHO:SYNC:SYMBol:SRATe =30000 63, when [:SENSe]:CWCDma:RHO:SYNC:SYMBol:SRATe =60000 31, when [:SENSe]:CWCDma:RHO:SYNC:SYMBol:SRATe =120000 15, when [:SENSe]:CWCDma:RHO:SYNC:SYMBol:SRATe =240000 7, when [:SENSe]:CWCDma:RHO:SYNC:SYMBol:SRATe =480000 3, when [:SENSe]:CWCDma:RHO:SYNC:SYMBol:SRATe =960000
Initial S/W Revision	Prior to A.02.00

Sync Type [MS only] (Remote Command Only)

Accesses a menu that allows you to select the channel to synchronize with. You can select from the following types listed in the menu:

- **DPCCh** - Synchronize to DPCCH and the Slot Format which is specified by [:SENSe]:CWCDma:RHO:SFORmat:MS
- **PMESsage** - Synchronize to PRACH Message and the Slot Format which is specified by [:SENSe]:CWCDma:RHO:PRACh:SIGNature and [:SENSe]:CWCDma:RHO:SFORmat:MS.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SYNC:MS DPCCh|PMESsage` `[:SENSe]:CWCDma:RHO:SYNC:MS?`
Example	CWCD:RHO:SYNC:MS DPCC CWCD:RHO:SYNC:MS?
Notes	This command is effective when [:SENSe]:RADio:DEVice is set to MS.
Preset	DPCCh
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Primary Scramble Code [BTS only] (Remote Command Only)

Set the BTS primary scramble code for synchronization. The BTS scramble code number (Down Link) is determined by the “Primary Scramble Code”, “Scramble Code Offset” and “Scramble Code Type”.

The following information is an excerpt from TS25.213 Section 5.2.2 Scramble Code.

A total of 2^{18}–1 = 262,143 scrambling codes, numbered 0…262,142 can be generated. However, not all the scrambling codes are used. The scrambling codes are divided into 512 sets, each consisting of a primary scrambling code and 15 secondary scrambling codes.

*The primary scrambling codes consist of scrambling codes n = 16*i where i = 0…511. The i:th set of secondary scrambling codes consists of scrambling codes 16*i + k, where k = 1…15.*

There is a one-to-one mapping between each primary scrambling code and the 15 secondary scrambling codes in a set such that i:th primary scrambling code corresponds to i:th set of secondary scrambling codes.

Hence, according to the above, scrambling codes k = 0, 1, …, 8191 are used. Each of these codes is associated with a left alternative scrambling code and a right alternative scrambling code that may be used for compressed frames. The left alternative scrambling code corresponding to scrambling code k is scrambling code number k + 8192, while the right alternative scrambling code corresponding to scrambling code k is scrambling code number k + 16384. The alternative scrambling codes can be used for compressed frames. In this case, the left alternative scrambling

code is used if n < SF/2, and the right alternative scrambling code is used if n ≥SF/2, where $c_{ch,SF,n}$ is the channelization code used for non-compressed frames. The usage of an alternative scrambling code for compressed frames is signalled by higher layers for each physical channel respectively.

The Primary Scramble Code corresponds to i (i = 0 … 511), the Scramble Code Offset corresponds to k (k = 1 … 15: Secondary Scramble Code, 0: Primary Scramble Code) and Scramble Code Type Left and Right correspond to +8192 and +16384 offsets respectively.

If the Device is set to BTS, you can enter a numeric value for the primary scramble code. The range is 0 to 511.

If the Device is set to MS, the label of this key changes to **Slot Format** to define the DPCCH pilot pattern to synchronize with. You can enter either 0 or 2 slot formats.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SYNC:SCRamble[:BTS] <integer>` `[:SENSe]:CWCDma:RHO:SYNC:SCRamble[:BTS]?`
Example	CWCD:RHO:SYNC:SCR 100 CWCD:RHO:SYNC:SCR?
Notes	This command is effective when [:SENSe]:RADio:DEVice is set to BTS.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	511
Initial S/W Revision	Prior to A.02.00

Slot Format [MS only] (Remote Command Only)

Defines the uplink DPCCH pilot pattern to synchronize with. The command is effective when the **Sync Type** ([:SENSe]:CWCDma:RHO:SYNC:MS command: see “Sync Type [MS only] (Remote Command Only)” on page 169) is set to DPCCh.

Slot formats 0A, 0B, 2A, 2B, 5A and 5B (as specified in Table 2 of Section 5.2.1 of TS25.211 V.3.9.0) are not supported, because the compressed mode is not supported.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SFORmat:MS SF0|SF1|SF2|SF3|SF4|SF5` `[:SENSe]:CWCDma:RHO:SFORmat:MS?`
Example	CWCD:RHO:SFOR:MS SF0 CWCD:RHO:SFOR:MS?

Notes	This command is effective when [:SENSe]:RADio:DEVice is set to MS, and [:SENSe]:CWCDma:RHO:SYNC:MS is set to DPCCh.
Preset	SF0
State Saved	Saved in instrument state.
Range	SF0|SF1|SF2|SF3|SF4|SF5
Initial S/W Revision	Prior to A.02.00

Preamble Signature [MS only] (Remote Command Only)

Sets the PRACH Preamble Signature number for PRACH Message detection. Based on this value, the code allocation of the PRACH message control part is calculated. This command is effective when the **Sync Type** ([:SENSe]:CWCDma:RHO:SYNC:MS command: see “Sync Type [MS only] (Remote Command Only)” on page 169) is set to PMESsage (PRACH Message).

PRACH message (Control) has only Slot Format #0. The field lengths are defined in the table below. Demod attribute information is colored according to the given Slot Format parameter. Using input parameter Slot Format #i, bit data is colored accordingly (for example, N_{pilot} and N_{TFCI}).

PRACH message Control field Information (TS25.211 V.3.9.0, Section 5.2.2.1.3)

Slot Format #i	Channel Bit Rate (kbps)	Channel Symbol Rate (ksps)	SF	Bits/ Frame	Bits/ Slot	N_{pilot}	N_{TFCI}
0	15	15	256	150	10	8	2

Available settings are Auto (ON) or Man (Manual: OFF).

When Auto (ON) is selected, the instrument searches and synchronizes the PRACH Message control part automatically. The code for the control part is assigned according to the PRACH Preamble Signature number. It can find the code number for the control part from 16 possible cases, but requires more time than manual setting. "---" is shown initially.

When Man (OFF) is selected, the instrument synchronizes with the code specified by the Preamble Signature.

The value is set at its auto number and “---“ is replaced with the detected number, if PRACH Search is set to Auto and PRACH Message sync is completed successfully (PRACH Message control part is detected). Otherwise the value is not changed.

NOTE This function does not check the Preamble Signature itself. Instead, using this information, it identifies the code location for the PRACH Message control part. The relationship between “Preamble Signature” and “code location for PRACH Message control part” is a one-to-one correspondence.

Mode	WCDMA

Remote Command	`[:SENSe]:CWCDma:RHO:PRACh:SIGNature <integer>`
	`[:SENSe]:CWCDma:RHO:PRACh:SIGNature?`
	`[:SENSe]:CWCDma:RHO:PRACh:SIGNature:AUTO OFF|ON|0|1`
	`[:SENSe]:CWCDma:RHO:PRACh:SIGNature:AUTO?`

Example	CWCD:RHO:PRAC:SIGN 3 CWCD:RHO:PRAC:SIGN? CWCD:RHO:PRAC:SIGN:AUTO OFF CWCD:RHO:PRAC:SIGN:AUTO?
Notes	This command is effective when [:SENSe]:RADio:DEVice is set to MS, and [:SENSe]:CWCDma:RHO:SYNC:MS is set to PMESsage. Set Signature Auto mode ON for PRACH Preamble detection.
Preset	0 ON
State Saved	Saved in instrument state.
Min	0
Max	15
Initial S/W Revision	Prior to A.02.00

Scramble Code Offset [BTS only] (Remote Command Only)

Sets the number of scramble code offsets needed to make the modulation accuracy measurement.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SYNC:SCRamble[:BTS]:OFFSet <integer>` `[:SENSe]:CWCDma:RHO:SYNC:SCRamble[:BTS]:OFFSet?`
Example	CWCD:RHO:SYNC:SCR:OFFS 5 CWCD:RHO:SYNC:SCR:OFFS?

Notes	This command is effective when [:SENSe]:RADio:DEVice is set to BTS.
Preset	0
State Saved	Saved in instrument state.
Range	0 to 15 (0 for the primary scramble code; 1 to 15 for the secondary scramble code)
Initial S/W Revision	Prior to A.02.00

Scramble Code [MS only] (Remote Command Only)

Set the MS scramble code for synchronization.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SYNC:SCRamble:MS <integer>` `[:SENSe]:CWCDma:RHO:SYNC:SCRamble:MS?`
Example	CWCD:RHO:SYNC:SCR:MS 10000000 CWCD:RHO:SYNC:SCR:MS?
Notes	This command is effective when [:SENSe]:RADio:DEVice is set to MS.
Preset	0 (0x0
State Saved	Saved in instrument state.
Range	0 to 16777215 (0x0 to 0xFFFFFF; 24 bits)
Initial S/W Revision	Prior to A.02.00

Scramble Code Type [BTS only] (Remote Command Only)

Sets the BTS primary scramble code type for synchronization.

Enables you to set the scramble code type to either Std (standard), Left, or Right to make the modulation accuracy measurement.

- LEFT – the left alternative scrambling code, whose value is the primary scramble code number + 8192, is used.
- RIGHt – the right alternative scrambling code, whose value is the primary scrambling code number + 16384, is used.
- STANdard – the standard scrambling code, whose value is the primary scrambling code number, is used.

Mode	WCDMA

Remote Command	`[:SENSe]:CWCDma:RHO:SYNC:SCRamble[:BTS]:TYPE LEFT|RIGHt|STANdard` `[:SENSe]:CWCDma:RHO:SYNC:SCRamble[:BTS]:TYPE?`
Example	CWCD:RHO:SYNC:SCR:TYPE LEFT
Notes	This command is effective when [:SENSe]:RADio:DEVice is set to BTS.
Preset	STANdard
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Symbol Boundary [BTS only] (Remote Command Only)

The symbol boundary detection modes are used to make the modulation accuracy measurement.

- AUTO - Sets symbol boundary detection to the automatic mode. Various code channels are measured and the most appropriate code channel is selected as the reference channel.

The following selections of DPCH channel numbers are available for making the Mod Accuracy Measurement.

- TM1D16 - Select this to set the Mod Accuracy Measurement to the Test Model 1 with 16 DPCH channels and 1 S-CCPCH channel.
- TM1D32 - Select this to set the Mod Accuracy Measurement to Test Model 1 with 32 DPCH channels and 1 S-CCPCH channel.
- TM1D64 - Select this to set the Mod Accuracy Measurement to Test Model 1 with 64 DPCH channels and 1 S-CCPCH channel.
- TM2SC - Select this to set the Mod Accuracy Measurement to Test Model 2 with 1 S-CCPCH channel.
- TM3D16SC - Select this to set the Mod Accuracy Measurement to Test Model 3 with 16 DPCH channels and 1 S-CCPCH channel.
- TM3D32SC - Select this to set the Mod Accuracy Measurement to Test Model 3 with 32 DPCH channels and 1 S-CCPCH channel.
- TM4CP - Select this to set the Mod Accuracy Measurement to Test Model 4 with 1 CPICH channel.
- TM4 - Select this to set the Mod Accuracy Measurement to Test Model 4 (no CPICH channel).
- TM5H2 - Select this to set the Mod Accuracy Measurement to Test Model 5 with 2 HS-PDSCH channels and 6 DPCH channels.
- TM5H4 - Select this to set the Mod Accuracy Measurement to Test Model 5 with 4 HS-PDSCH channels and 14 DPCH channels.
- TM5H8 - Select this to set the Mod Accuracy Measurement to Test Model 5 with 8 HS-PDSCH channels and 30 DPCH channels.

- CUSTom – “Custom” choice provides a flexible way to specify predefined active channels. By choosing it, you can specify a customized list of active channels using the following remote command: Initialize List, Append List and Replace List.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SBOundary[:BTS] AUTO|TM1D16|TM1D32|TM1D64|TM1D16SC|TM1D32SC|TM1D64SC|TM2|TM2SC|TM3D16|TM3D32|TM3D16SC|TM3D32SC|TM4|TM4CP|TM5H2|TM5H4|TM5H8|CUSTom` `[:SENSe]:CWCDma:RHO:SBOundary[:BTS]?`
Example	CWCD:RHO:SBO:BTS TM1D16 CWCD:RHO:SBO:BTS?
Notes	This command is effective when [:SENSe]:RADio:DEVice is set to BTS.
Preset	AUTO
State Saved	Saved in instrument state.
Range	AUTO|TM1D16|TM1D32|TM1D64|TM1D16SC|TM1D32SC|TM1D64SC|TM2|TM2SC|TM3D16|TM3D32|TM3D16SC|TM3D32SC|TM4|TM4CP|TM5H2|TM5H4|TM5H8|CUSTom
Initial S/W Revision	Prior to A.02.00

Test Model 1

Allows you to select from a variety of configurations using Test Model 1.

TS25.141 Table 6.1: Test Model 1 (2002–09 version) (S-CCPCH included)

Type	Number of Channels	Fraction of Power (%)	Level setting (dB)	Channelization Code	Timing offset (x256T_{chip})
P-CCPCH+SCH	1	10	–10	1	0
Primary CPICH	1	10	–10	0	0
PICH	1	1.6	–18	16	120
S-CCPCH containing PCH (SF=256)	1	1.6	–18	3	0

Type	Number of Channels	Fraction of Power (%)	Level setting (dB)	Channelization Code	Timing offset (x256T_{chip})
DPCH (SF=128)	16/32/64	76.8 in total	see 3GPP TS25.141 Table 6.2	see 3GPP TS25.141 Table 6.2	see 3GPP TS25.141 Table 6.2

Test Model 1 w/16 DPCH w/S-CCPCH [BTS only]

TS25.141 Table 6.1: Test Model 1 (2002–09 version) (S-CCPCH included)

Type	Number of Channels	Fraction of Power (%)	Level setting (dB)	Channelization Code	Timing offset (x256T_{chip})
P-CCPCH+SCH	1	10	–10	1	0
Primary CPICH	1	10	–10	0	0
PICH	1	1.6	–18	16	120
S-CCPCH containing PCH (SF=256)	1	1.6	–18	3	0
DPCH (SF=128)	16/32/64	76.8 in total	see 3GPP TS25.141 Table 6.2	see 3GPP TS25.141 Table 6.2	see 3GPP TS25.141 Table 6.2

Test Model 1 w/32 DPCH w/S-CCPCH [BTS only]

TS25.141 Table 6.1: Test Model 1 (2002–09 version) (S-CCPCH included)

Type	Number of Channels	Fraction of Power (%)	Level setting (dB)	Channelization Code	Timing offset (x256T_{chip})
P-CCPCH+SCH	1	10	–10	1	0
Primary CPICH	1	10	–10	0	0
PICH	1	1.6	–18	16	120

Type	Number of Channels	Fraction of Power (%)	Level setting (dB)	Channelization Code	Timing offset (x256T_{chip})
S-CCPCH containing PCH (SF=256)	1	1.6	–18	3	0
DPCH (SF=128)	16/32/64	76.8 in total	see 3GPP TS25.141 Table 6.2	see 3GPP TS25.141 Table 6.2	see 3GPP TS25.141 Table 6.2

Test Model 1 w/64 DPCH w/S-CCPCH [BTS only]

TS25.141 Table 6.1: Test Model 1 (2002–09 version) (S-CCPCH included)

Type	Number of Channels	Fraction of Power (%)	Level setting (dB)	Channelization Code	Timing offset (x256T_{chip})
P-CCPCH+SCH	1	10	–10	1	0
Primary CPICH	1	10	–10	0	0
PICH	1	1.6	–18	16	120
S-CCPCH containing PCH (SF=256)	1	1.6	–18	3	0
DPCH (SF=128)	16/32/64	76.8 in total	see 3GPP TS25.141 Table 6.2	see 3GPP TS25.141 Table 6.2	see 3GPP TS25.141 Table 6.2

Test Model 2

Allows you to select from a variety of configurations using Test Model 2.

TS25.141 Table 6.3: Test Model 2 (2002–09 version) (S-CCPCH included)

Type	Number of Channels	Fraction of Power (%)	Level setting (dB)	Channelization Code	Timing offset (x256T_{chip})
P-CCPCH+SCH	1	10	–10	1	0

Type	Number of Channels	Fraction of Power (%)	Level setting (dB)	Channelization Code	Timing offset (x256T_{chip})
Primary CPICH	1	10	–10	0	0
PICH	1	5	–13	16	120
S-CCPCH containing PCH (SF=256)	1	5	–13	3	0
DPCH (SF=128)	3	2 x 10,1 x 50	2 x –10, 1 x –3	24, 72, 120	1, 7, 2

Test Model 2 w/S-CCPCH [BTS only]

TS25.141 Table 6.: Test Model 2 (2002–09 version) (S-CCPCH included)

Type	Number of Channels	Fraction of Power (%)	Level setting (dB)	Channelization Code	Timing offset (x256T_{chip})
P-CCPCH+SCH	1	10	–10	1	0
Primary CPICH	1	10	–10	0	0
PICH	1	5	–13	16	120
S-CCPCH containing PCH (SF=256)	1	5	–13	3	0
DPCH (SF=128)	3	2 x 10,1 x 50	2 x –10, 1 x –3	24, 72, 120	1, 7, 2

Test Model 3

Allows you to select from a variety of configurations using Test Model 3.

Type	Number of Channels	Fraction of Power (%) 16/32	Level settings (dB) 16/32	Channelization Code	Timing offset (x256T_{chip})
P-CCPCH+SCH	1	12,6/7,9	–9 / –11	1	0

Type	Number of Channels	Fraction of Power (%) 16/32	Level settings (dB) 16/32	Channelization Code	Timing offset (x256T_{chip})
Primary CPICH	1	12,6/7,9	–9 / –11	0	0
PICH	1	5/1.6	–13/–18	16	120
S-CCPCH containing PCH (SF=256)	1	5/1.6	–13/–18	3	0
DPCH (SF=256)	16/32	63,7/80,4 in total	see 3GPP TS25.141 Table 6.5	see 3GPP TS25.141 Table 6.5	see 3GPP TS25.141 Table 6.5

Test Model 3 w/16 DPCH w/S-CCPCH [BTS only]

Type	Number of Channels	Fraction of Power (%) 16/32	Level settings (dB) 16/32	Channelization Code	Timing offset (x256T_{chip})
P-CCPCH+SCH	1	12,6/7,9	–9 / –11	1	0
Primary CPICH	1	12,6/7,9	–9 / –11	0	0
PICH	1	5/1.6	–13/–18	16	120
S-CCPCH containing PCH (SF=256)	1	5/1.6	–13/–18	3	0
DPCH (SF=256)	16/32	63,7/80,4 in total	see 3GPP TS25.141 Table 6.5	see 3GPP TS25.141 Table 6.5	see 3GPP TS25.141 Table 6.5

Test Model 3 w/32 DPCH w/S-CCPCH [BTS only]

Type	Number of Channels	Fraction of Power (%) 16/32	Level settings (dB) 16/32	Channelization Code	Timing offset (x256T_{chip})
P-CCPCH+SCH	1	12,6/7,9	–9 / –11	1	0
Primary CPICH	1	12,6/7,9	–9 / –11	0	0
PICH	1	5/1.6	–13/–18	16	120
S-CCPCH containing PCH (SF=256)	1	5/1.6	–13/–18	3	0
DPCH (SF=256)	16/32	63,7/80,4 in total	see 3GPP TS25.141 Table 6.5	see 3GPP TS25.141 Table 6.5	see 3GPP TS25.141 Table 6.5

Test Model 4

Allows you to select from a variety of configurations using Test Model 4.

Test Model 4 Active Channels

Type	Number of Channels	Fraction of Power (%)	Level setting (dB)	Channelization Code	Timing offset	Type
PCCPCH+SCH	1	50 to 1.6	–3 to –18	1	0	PCCPCH+SCH
Primary CPICH[1]	1	10	–10	0	0	Primary CPICH[1]

Note 1: The CPICH channel is optional.

Test Model 4 w/P-CPICH [BTS only]

Test Model 4 Active Channels

Type	Number of Channels	Fraction of Power (%)	Level setting (dB)	Channelization Code	Timing offset	Type
PCCPCH+SCH	1	50 to 1.6	–3 to –18	1	0	PCCPCH+SCH
Primary CPICH[1]	1	10	–10	0	0	Primary CPICH[1]

Note 1: The CPICH channel is optional.

Test Model 4 (with no CPICH)

Test Model 4 Active Channels

Type	Number of Channels	Fraction of Power (%)	Level setting (dB)	Channelization Code	Timing offset	Type
PCCPCH+SCH	1	50 to 1.6	–3 to –18	1	0	PCCPCH+SCH
Primary CPICH[1]	1	10	–10	0	0	Primary CPICH[1]

Note 1: The CPICH channel is optional.

Test Model 5

Allows you to select from a variety of configurations using Test Model 5.

Table 6.6A: Test Model 5 Active Channels (2000–12 version)

Type	Number of Channels	Fraction of Power (%)	Level setting (dB)	Channelization Code	Timing offset (x256T_{chip})
P-CCPCH+SCH	1	7.9	–11	1	0
Primary CPICH	1	7.9	–11	0	0
PICH	1	1.3	–19	16	120
S-CCPCH containing PCH (SF=256)	1	1.3	–19	3	0
DPCH (SF=128)	30/14/6[a]	14/14.2/14.4 in total	see 3GPP TS25.141 Table 6.b	see 3GPP TS25.141 Table 6.b	see 3GPP TS25.141 Table 6.b
HS-SCCH	2	4 in total	see 3GPP TS25.141 Table 6.c	see 3GPP TS25.141 Table 6.c	see 3GPP TS25.141 Table 6.c
HS-PDSCH (16QAM)	8/4/2[a]	63.6/63.4/63.2 in total	see 3GPP TS25.141 Table 6.d	see 3GPP TS25.141 Table 6.d	see 3GPP TS25.141 Table 6.d

a. Note: 2 HS-PDSCH shall be taken together with 6 DPCH, 4 HS-PDSCH shall be taken with 14 DPCH, and 8 HS-PDSCH shall be taken together with 30 DPCH.

Test Model 5 w/2 HS-PDSCH, w/6 DPCH [BTS only]

Table 6.6A: Test Model 5 Active Channels (2000–12 version)

Type	Number of Channels	Fraction of Power (%)	Level setting (dB)	Channelization Code	Timing offset (x256T_{chip})
P-CCPCH+SCH	1	7.9	–11	1	0
Primary CPICH	1	7.9	–11	0	0
PICH	1	1.3	–19	16	120

Type	Number of Channels	Fraction of Power (%)	Level setting (dB)	Channelization Code	Timing offset (x256T_{chip})
S-CCPCH containing PCH (SF=256)	1	1.3	–19	3	0
DPCH (SF=128)	30/14/6[a]	14/14.2/14.4 in total	see 3GPP TS25.141 Table 6.b	see 3GPP TS25.141 Table 6.b	see 3GPP TS25.141 Table 6.b
HS-SCCH	2	4 in total	see 3GPP TS25.141 Table 6.c	see 3GPP TS25.141 Table 6.c	see 3GPP TS25.141 Table 6.c
HS-PDSCH (16QAM)	8/4/2[a]	63.6/63.4/63.2 in total	see 3GPP TS25.141 Table 6.d	see 3GPP TS25.141 Table 6.d	see 3GPP TS25.141 Table 6.d

a. Note: 2 HS-PDSCH shall be taken together with 6 DPCH, 4 HS-PDSCH shall be taken with 14 DPCH, and 8 HS-PDSCH shall be taken together with 30 DPCH.

Test Model 5 w/ 4 HS-PDSCH, w/14 DPCH [BTS only]

Table 6.6A: Test Model 5 Active Channels (2000–12 version)

Type	Number of Channels	Fraction of Power (%)	Level setting (dB)	Channelization Code	Timing offset (x256T_{chip})
P-CCPCH+SCH	1	7.9	–11	1	0
Primary CPICH	1	7.9	–11	0	0
PICH	1	1.3	–19	16	120
S-CCPCH containing PCH (SF=256)	1	1.3	–19	3	0
DPCH (SF=128)	30/14/6[a]	14/14.2/14.4 in total	see 3GPP TS25.141 Table 6.b	see 3GPP TS25.141 Table 6.b	see 3GPP TS25.141 Table 6.b
HS-SCCH	2	4 in total	see 3GPP TS25.141 Table 6.c	see 3GPP TS25.141 Table 6.c	see 3GPP TS25.141 Table 6.c

Type	Number of Channels	Fraction of Power (%)	Level setting (dB)	Channelization Code	Timing offset (x256T_{chip})
HS-PDSCH (16QAM)	8/4/2[a]	63.6/63.4/ 63.2 in total	see 3GPP TS25.141 Table 6.d	see 3GPP TS25.141 Table 6.d	see 3GPP TS25.141 Table 6.d

a. Note: 2 HS-PDSCH shall be taken together with 6 DPCH, 4 HS-PDSCH shall be taken with 14 DPCH, and 8 HS-PDSCH shall be taken together with 30 DPCH.

Test Model 5 w/ 8 HS-PDSCH, w/30 DPCH [BTS only]

Table 6.6A: Test Model 5 Active Channels (2000–12 version)

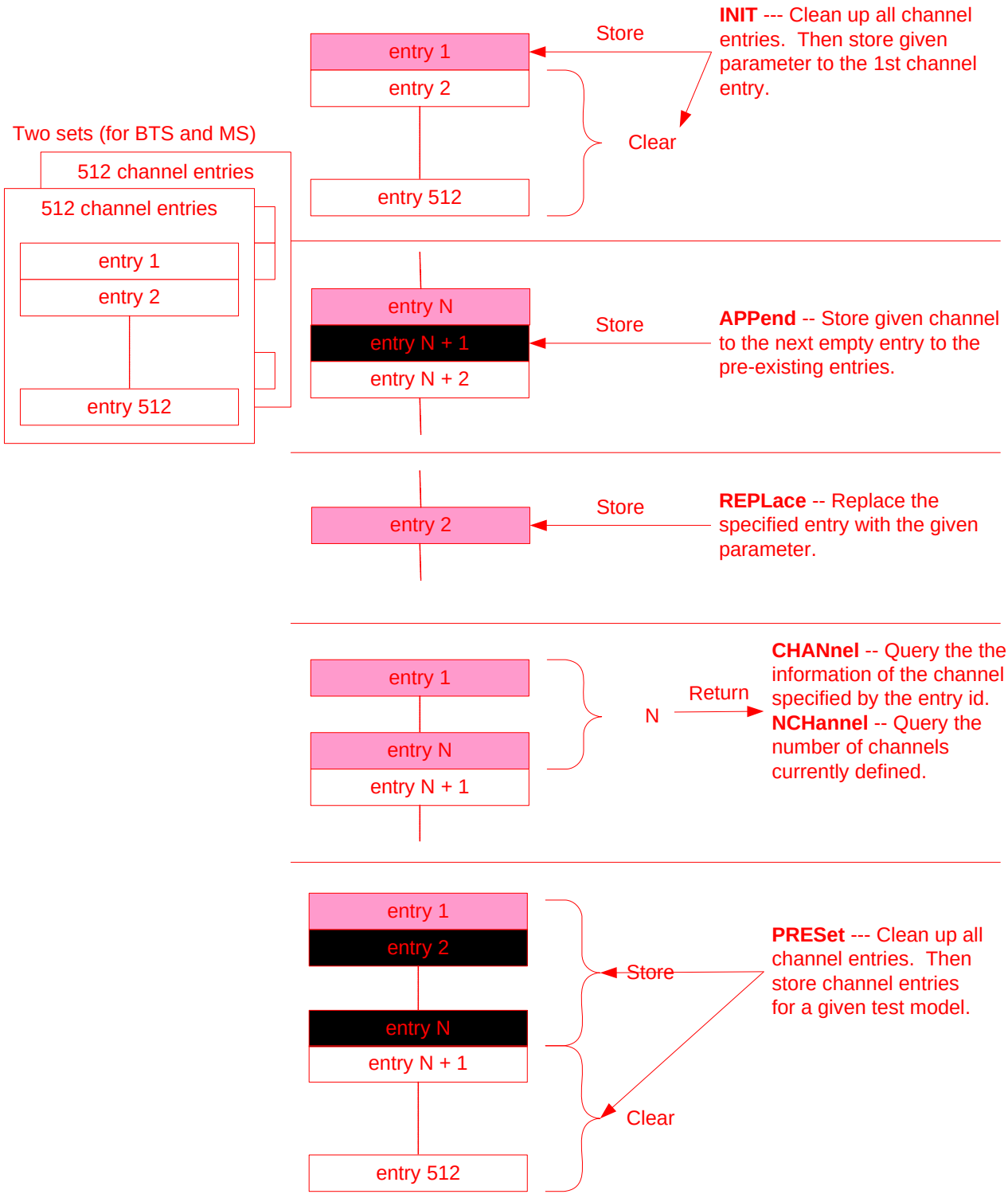
Type	Number of Channels	Fraction of Power (%)	Level setting (dB)	Channelization Code	Timing offset (x256T_{chip})
P-CCPCH+SCH	1	7.9	–11	1	0
Primary CPICH	1	7.9	–11	0	0
PICH	1	1.3	–19	16	120
S-CCPCH containing PCH (SF=256)	1	1.3	–19	3	0
DPCH (SF=128)	30/14/6(*)[a]	14/14.2/14.4 in total	see 3GPP TS25.141 Table 6.b	see 3GPP TS25.141 Table 6.b	see 3GPP TS25.141 Table 6.b
HS-SCCH	2	4 in total	see 3GPP TS25.141 Table 6.c	see 3GPP TS25.141 Table 6.c	see 3GPP TS25.141 Table 6.c
HS-PDSCH (16QAM)	8/4/2[a]	63.6/63.4 /63.2 in total	see 3GPP TS25.141 Table 6.d	see 3GPP TS25.141 Table 6.d	see 3GPP TS25.141 Table 6.d

a. Note: 2 HS-PDSCH shall be taken together with 6 DPCH, 4 HS-PDSCH shall be taken with 14 DPCH, and 8 HS-PDSCH shall be taken together with 30 DPCH.

Custom Active Channel List BTS [BTS only]

The following commands handle the list of custom active channel list for BTS.

- INIT – Cleans up (clears) all channel entries. Then stores given parameter to the 1st channel entry. See “Initialize List (Remote Command Only)” on page 186.
- APPend – Stores the given channel to the next empty entry to the pre-existing entries. See “Append List (Remote Command Only)” on page 190.
- REPLace - Replaces the specified entry with the given parameter. See “Replace List (Remote Command Only)” on page 193.
- CHANnel – Queries the information of the channel specified by the entry id. See “Query List (Remote Command Only)” on page 196.
- NCHannel - Queries the number of channels currently defined. See “Number of entries (Remote Query Only)” on page 199.
- PRESet – Cleans up (clears) all channel entries. Then stores channel entries for a given test model. See “Load Preset Setting (Remote Command Only)” on page 199.



Initialize List (Remote Command Only)

Initializes the current custom active channel list. This creates a new entry with the specified parameters.

1st parameter:

<symbol_rate>	Specifies symbol rate of the channel.

2nd parameter:

<code_num>	Specifies code number of the channel.

3rd parameter:

QPSK	Specifies the channel's modulation scheme is QPSK.
QAM16	Specifies the channel's modulation scheme is QAM16. This choice is available only for channels with a symbol rate of 240000.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SBOundary:LIST[:BTS]:INIT <symbol_rate>, <code_num>, QPSK|QAM16`

Example

To predefine the following channels:

- CPICH (C8(0))
- P-CCPCH (C8(1))
- S-CCPCH(C8(3))
- PICH(C8(16))
- HS-DPCCH (C4(15)) 16QAM modulated

Send the following sequence:

```
CWCD:RHO:SBO:LIST:BTS:INIT 15000,0, QPSK
CWCD:RHO:SBO:LIST:BTS:APP 15000,1, QPSK
CWCD:RHO:SBO:LIST:BTS:APP 15000,3, QPSK
CWCD:RHO:SBO:LIST:BTS:APP 15000,16, QPSK
CWCD:RHO:SBO:LIST:BTS:APP 240000,15, QAM16
CWCD:RHO:SBO:LIST:NCH:BTS?
5
CWCD:RHO:SBO:LIST:BTS:CHAN? 1
15000,0, QPSK
CWCD:RHO:SBO:LIST:BTS:CHAN? 2
15000,1, QPSK
CWCD:RHO:SBO:LIST:BTS:CHAN? 3
15000,3, QPSK
CWCD:RHO:SBO:LIST:BTS:CHAN? 4
15000,16, QPSK
CWCD:RHO:SBO:LIST:BTS:CHAN? 5
240000,15, QAM16
```

Notes

(1) This command is effective when [:SENSe]:RADio:DEVice is set to BTS and [:SENSe]:CWCDma:RHO:SBOundary[:BTS] is set to CUSTom.

(2) QAM16 for the 4th parameter is available only if HSDPA/HSUPA Enable is On

Error messages associated with this parameter:

One of the following error messages is logged if the given parameter is invalid. If an error is reported, the SCPI command is rejected and the instrument's settings do not change.

(1) "Missing Parameter"

This error is reported if the number of parameters is less than 3.

For example,

:SENSe:CWCDma:RHO:SBOundary:LIST:BTS:INIT, 15000, 0 <– 3rd parameter is missing.

(2) "Illegal parameter value"

This error is reported if parameter type is invalid or if enum value is invalid.

For example,

:SENSe:CWCDma:RHO:SBOundary:LIST:BTS:INIT, 15000, ON, QPSK <– 2nd parameter must be integer.

:SENSe:CWCDma:RHO:SBOundary:LIST:BTS:INIT 15001, 8, QPSK <– 1st parameter value (Symbol Rate) is not allowed.

Only the values given in the Range field are valid for the Symbol Rate. You may specify these in numeric form, but they are interpreted as an enumeration and the error results if the value does not translate to one in the list.

(3) "Data out of range"

This error is reported if parameter value is out of range.

For example,

:SENSe:CWCDma:RHO:SBOundary:LIST:BTS:INIT 15000, 256, QPSK <– 2nd parameter is out of range.

(4) "Setting Conflict"

This error is reported if the given code channel overlaps another code channel in modulation accuracy.

For example, if a user sends the following two commands, the second command causes the error message because C7(0) overlaps C8(0).

:SENSe:CWCDma:RHO:SBOundary:LIST:BTS:INIT 15000, 0, QPSK <- OK

:SENSe:CWCDma:RHO:SBOundary:LIST:BTS:APPend 30000, 0, QPSK <- C7(0) overlaps C8(0)

State Saved	Saved in instrument state.
Range	symbol_rate = 7500 | 15000 | 30000 | 60000 | 120000 | 240000 | 480000 | 960000 0<= code_num <= 511 if symbol_rate = 7500 0<= code_num <= 255 if symbol_rate = 15000 0<= code_num <= 127 if symbol_rate = 30000 0<= code_num <= 63 if symbol_rate = 60000 0<= code_num <= 31 if symbol_rate = 120000 0<= code_num <= 15 if symbol_rate = 240000 0<= code_num <= 7 if symbol_rate = 480000 0<= code_num <= 3 if symbol_rate = 960000 QAM16 for the 3rd parameter is available only for channels with a symbol rate of 240000. For other channels, specify QPSK.
Initial S/W Revision	Prior to A.02.00

Append List (Remote Command Only)

Appends the entry on the list of custom active channel list for BTS.

1st parameter:

<symbol_rate>	Specifies symbol rate of the channel.

2nd parameter:

<code_num>	Specifies code number of the channel.

3rd parameter:

QPSK	Specifies the channel's modulation scheme is QPSK.
QAM16	Specifies the channel's modulation scheme is QAM16. This choice is available only for channels with a symbol rate of 240000.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SBOundary:LIST[:BTS]:APPend <symbol_rate>, <code_num>, QPSK|QAM16`

Example

To predefine the following channels:

- CPICH (C8(0))
- P-CCPCH (C8(1))
- S-CCPCH(C8(3))
- PICH(C8(16))
- HS-DPCCH (C4(15)) 16QAM modulated

Send the following sequence:

```
CWCD:RHO:SBO:LIST:BTS:INIT 15000,0, QPSK
CWCD:RHO:SBO:LIST:BTS:APP 15000,1, QPSK
CWCD:RHO:SBO:LIST:BTS:APP 15000,3, QPSK
CWCD:RHO:SBO:LIST:BTS:APP 15000,16, QPSK
CWCD:RHO:SBO:LIST:BTS:APP 240000,15, QAM16
CWCD:RHO:SBO:LIST:NCH:BTS?
5
CWCD:RHO:SBO:LIST:BTS:CHAN? 1
15000,0, QPSK
CWCD:RHO:SBO:LIST:BTS:CHAN? 2
15000,1, QPSK
CWCD:RHO:SBO:LIST:BTS:CHAN? 3
15000,3, QPSK
CWCD:RHO:SBO:LIST:BTS:CHAN? 4
15000,16, QPSK
CWCD:RHO:SBO:LIST:BTS:CHAN? 5
240000,15, QAM16
```

Notes

(1) This command is effective when [:SENSe]:RADio:DEVice is set to BTS and [:SENSe]:CWCDma:RHO:SBOundary[:BTS] is set to CUSTom.

(2) QAM16 for the 4th parameter, is available only if HSDPA/HSUPA Enable is On.

(3) The maximum number of entries is 512.

Error messages associated with this parameter:

One of the following error messages is logged if the given parameter is invalid. If an error is reported, the SCPI command is rejected and the instrument's settings do not change.

(1) "Missing Parameter"

This error is reported if the number of parameters is less than 4. For example,

:SENSe:CWCDma:RHO:SBOundary:LIST:BTS:APPend, 15000, 0<– 3rd parameter is missing.

(2) "Illegal parameter value"

This error is reported if parameter type is invalid or if enum value is invalid. For example,

:SENSe:CWCDma:RHO:SBOundary:LIST:BTS:APPend 15000, ON, QPSK <– 2nd parameter must be integer.

:SENSe:CWCDma:RHO:SBOundary:LIST:BTS:APPend, 15001, 8, QPSK <– 1st parameter value (Symbol Rate) is not allowed.

Only the values given in the Range field are valid for the Symbol Rate. You may specify these in numeric form, but they are interpreted as an enumeration and the error results if the value does not translate to one in the list.

(3) "Data out of range"

This error is reported if parameter value is out of range. For example,

:SENSe:CWCDma:RHO:SBOundary:LIST:BTS:APPend 15000, 256, QPSK <– 2nd parameter is out of range.

(4) "Setting Conflict"

This error is reported if the given code channel overlaps another code channel in Combined WCDMA.

For example, if a user sends the following two commands, the second command causes the error message because C7(0) overlaps C8(0).

:SENSe:CWCDma:RHO:SBOundary:LIST:BTS:INIT, 15000, 0, QPSK <- OK

:SENSe:CWCDma:RHO:SBOundary:LIST:BTS:APPend 30000, 0, QPSK <- C7(0) overlaps C8(0)

State Saved	Saved in instrument state.
Range	symbol_rate = 7500 | 15000 | 30000 | 60000 | 120000 | 240000 | 480000 | 960000 0<= code_num <= 511 if symbol_rate = 7500 0<= code_num <= 255 if symbol_rate = 15000 0<= code_num <= 127 if symbol_rate = 30000 0<= code_num <= 63 if symbol_rate = 60000 0<= code_num <= 31 if symbol_rate = 120000 0<= code_num <= 15 if symbol_rate = 240000 0<= code_num <= 7 if symbol_rate = 480000 0<= code_num <= 3 if symbol_rate = 960000 QAM16 for the 3rd parameter is available only for channels with a symbol rate of 240000. For other channels, specify QPSK.
Initial S/W Revision	Prior to A.02.00

Replace List (Remote Command Only)

Replaces the entry of the custom active channel list for BTS.

1st parameter:

<entry_id>	Specifies entry ID of the channel to replace.

2nd parameter:

<symbol_rate>	Specifies symbol rate of the channel.

3rd parameter:

<code_num>	Specifies code number of the channel.

4th parameter:

QPSK	Specifies the channel's modulation scheme is QPSK.
QAM16	Specifies the channel's modulation scheme is QAM16. This choice is available only for channels with a symbol rate of 240000.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SBOundary:LIST[:BTS]:REPLace <entry_id>, <symbol_rate>, <code_num>, QPSK|QAM16`

Example

To predefine the following channels:

- CPICH (C8(0))
- P-CCPCH (C8(1))
- S-CCPCH(C8(3))
- PICH(C8(16))
- HS-DPCCH (C4(15)) 16QAM modulated

Send the following sequence:

CWCD:RHO:SBO:LIST:BTS:INIT 15000,0,QPSK

CWCD:RHO:SBO:LIST:BTS:APP 15000,1,QPSK

CWCD:RHO:SBO:LIST:BTS:APP 15000,3,QPSK

CWCD:RHO:SBO:LIST:BTS:APP 15000,16,QPSK

CWCD:RHO:SBO:LIST:BTS:APP 240000,15,QAM16

And, P-CCPCH(C8(3)) is replaced as follows:

CWCD:RHO:SBO:LIST:BTS:REPL 3,15000,5,QPSK

CWCDma:RHO:SBOundary:LIST:NCHannels:BTS?

5

CWCD:RHO:SBO:LIST:BTS:CHAN? 1

15000,0, QPSK

CWCD:RHO:SBO:LIST:BTS:CHAN? 2

15000,1, QPSK

CWCD:RHO:SBO:LIST:BTS:CHAN? 3

15000,5, QPSK

CWCD:RHO:SBO:LIST:BTS:CHAN? 4

15000,16, QPSK

CWCD:RHO:SBO:LIST:BTS:CHAN? 5

240000,15, QAM16

Notes

(1) This command is effective when [:SENSe]:RADio:DEVice is set to BTS and [:SENSe]:CWCDma:RHO:SBOundary[:BTS] is set to CUSTom.

(2) QAM16 for the 4th parameter is available only if HSDPA/HSUPA Enable is On.

(3) The maximum number of entries is 512.

Error messages associated with this parameter:

One of the following error messages is logged if the given parameter is invalid. If an error is reported, the SCPI command is rejected and the instrument's settings do not change.

(1) "Missing Parameter"

This error is reported if the number of parameters is less than 4. For example,

:SENSe:CWCDma:RHO:SBOundary:LIST:BTS:REPLace 1,15000, 0 <– 4th parameter is missing.

(2) "Illegal parameter value"

This error is reported if parameter type is invalid or if enum value is invalid. For example,

:SENSe:CWCDma:RHO:SBOundary:LIST:BTS:REPLace 1,15000, ON, QPSK <– 3rd parameter must be integer.

:SENSe:CWCDma:RHO:SBOundary:LIST:BTS:REPLace 1,15001, 8, QPSK <– 2nd parameter value (Symbol Rate) is not allowed.

Only the values given in the Range field are valid for the Symbol Rate. You may specify these in numeric form, but they are interpreted as an enumeration and the error results if the value does not translate to one in the list.

(3) "Data out of range"

This error is reported if parameter value is out of range. For example,

:SENSe:CWCDma:RHO:SBOundary:LIST:BTS:REPLace 1,15000, 256, QPSK <– 3rd parameter is out of range.

"Setting Conflict"

This error is reported if the given code channel overlaps another code channel in Combined WCDMA.

For example, if a user sends the following two commands, the second command causes the error message because C7(0) overlaps C8(0).

:SENSe:CWCDma:RHO:SBOundary:LIST:BTS:INIT 15000, 0, QPSK <- OK

:SENSe:CWCDma:RHO:SBOundary:LIST:BTS:REPLace 1,30000, 0, QPSK <- C7(0) overlaps C8(0)

	(5) The entry ID out of range: 1 <= entry_id <= The number of entries that are currently appended.
State Saved	Saved in instrument state.
Range	The entry ID must be: 1 <= entry_id <= The number of entries which is currently appended. symbol_rate = 7500 | 15000 | 30000 | 60000 | 120000 | 240000 | 480000 | 960000 0<= code_num <= 511 if symbol_rate = 7500 0<= code_num <= 255 if symbol_rate = 15000 0<= code_num <= 127 if symbol_rate = 30000 0<= code_num <= 63 if symbol_rate = 60000 0<= code_num <= 31 if symbol_rate = 120000 0<= code_num <= 15 if symbol_rate = 240000 0<= code_num <= 7 if symbol_rate = 480000 0<= code_num <= 3 if symbol_rate = 960000 QAM16 for the 4th parameter is available only for channels with a symbol rate of 240000. For other channels, specify QPSK.
Initial S/W Revision	Prior to A.02.00

Query List (Remote Command Only)

This command returns the entry of the custom active channel list for BTS.

1st parameter:

<entry_id> Specifies entry ID of the channel to query.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SBOundary:LIST[:BTS]:CHANnel? <entry_id>`

Example

To predefine the following channels:

- CPICH (C8(0))
- P-CCPCH (C8(1))
- S-CCPCH(C8(3))
- PICH(C8(16))
- HS-DPCCH (C4(15)) 16QAM modulated

Send the following sequence:

```
CWCD:RHO:SBO:LIST:BTS:INIT 15000,0,QPSK
CWCD:RHO:SBO:LIST:BTS:APP 15000,1,QPSK
CWCD:RHO:SBO:LIST:BTS:APP 15000,3,QPSK
CWCD:RHO:SBO:LIST:BTS:APP 15000,16,QPSK
CWCD:RHO:SBO:LIST:BTS:APP 240000,15,QAM16
CWCD:RHO:SBO:LIST:NCH:BTS?
5
CWCD:RHO:SBO:LIST:BTS:CHAN? 1
15000,0,QPSK
CWCD:RHO:SBO:LIST:BTS:CHAN? 2
15000,1, QPSK
CWCD:RHO:SBO:LIST:BTS:CHAN? 3
15000,3, QPSK
CWCD:RHO:SBO:LIST:BTS:CHAN? 4
15000,16, QPSK
CWCD:RHO:SBO:LIST:BTS:CHAN? 5
240000,15, QAM16
```

Notes	(1) This command is effective when [:SENSe]:RADio:DEVice is set to BTS and [:SENSe]:CWCDma:RHO:SBOundary[:BTS] is set to CUSTom. (2) QAM16 for the 4th parameter is available only if HSDPA/HSUPA Enable is On. (3) The maximum number of entries is 512. Default value of the parameter: By default, one channel is defined. (CPICH C8(0)) In order to query the default entry, specify 1 for <entry_id>: :SENSe:CWCDma:RHO:SBOundary:LIST:BTS:CHANnel? 1 The instrument returns an array of three values: 15000, 0, QPSK The <entry_id> parameter is always required for the query. The range of the parameter is from 1 to the total number of channels you have defined. For example, if you have defined two channels, you can query them as follows: :SENSe:CWCDma:RHO:SBOundary:LIST:BTS:CHANnel? 1 :SENSe:CWCDma:RHO:SBOundary:LIST:BTS:CHANnel? 2 If you want to know the number of channels you have defined, send the following query command: :SENSe:CWCDma:RHO:SBOundary:LIST:BTS:NCHannels? Error messages associated with this parameter: The following error message is logged if the given parameter is invalid. (If an error is reported, the SCPI command is rejected and the instrument's settings do not change.) <entry_id> out of range The entry ID must be: 1 <= entry_id <= The number of entries which is currently appended.
Preset	15000, 0, QPSK
State Saved	Saved in instrument state.
Range	1 <= entry_id <= the number of channels defined <= 512 (<entry_id> is an integer ranging from 1 to 512.)
Initial S/W Revision	Prior to A.02.00

Number of entries (Remote Query Only)

Returns the number of entries in the custom predefined active channel list BTS. This is a query only command.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SBOundary:LIST[:BTS]:NCHannels?`
Example	CWCD:RHO:SBO:LIST:NCH?
Notes	This command is effective when [:SENSe]:RADio:DEVice is set to BTS and [:SENSe]:CWCDma:RHO:SBOundary[:BTS] is set to CUSTom. This is a query only.
Preset	1
State Saved	No
Initial S/W Revision	Prior to A.02.00

Load Preset Setting (Remote Command Only)

Loads preset setting to the custom active channel list BTS. This is a command-only command; it does not support a query.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SBOundary:LIST[:BTS]:PRESet TM1D16|TM1D32|TM1D64|TM1D16SC|TM1D32SC|TM1D64SC|TM2|TM2SC|TM3D16|TM3D32|TM3D16SC|TM3D32SC|TM4|TM4CP| TM5H2|TM5H4|TM5H8`
Example	CWCD:RHO:SBO:LIST:PRES TM1D64
Notes	(1) This command is effective when [:SENSe]:RADio:DEVice is set to BTS and [:SENSe]:CWCDma:RHO:SBOundary[:BTS] is set to CUSTom. (2) TM5H2, TM5H4, TM5H8 parameters are allowed if HSDPA/HSUPA Enable is On. This is a command only; there is no query.
State Saved	No
Range	TM1D16|TM1D32|TM1D64|TM1D16SC|TM1D32SC|TM1D64SC|TM2|TM2SC|TM3D16|TM3D32|TM3D16SC|TM3D32SC|TM4|TM4CP| TM5H2|TM5H4|TM5H8.
Initial S/W Revision	Prior to A.02.00

Symbol Boundary MS [MS only] (Remote Command Only)

Selects the symbol boundary detection mode for MS, which allows you to specify the active channel detection scheme for the uplink.

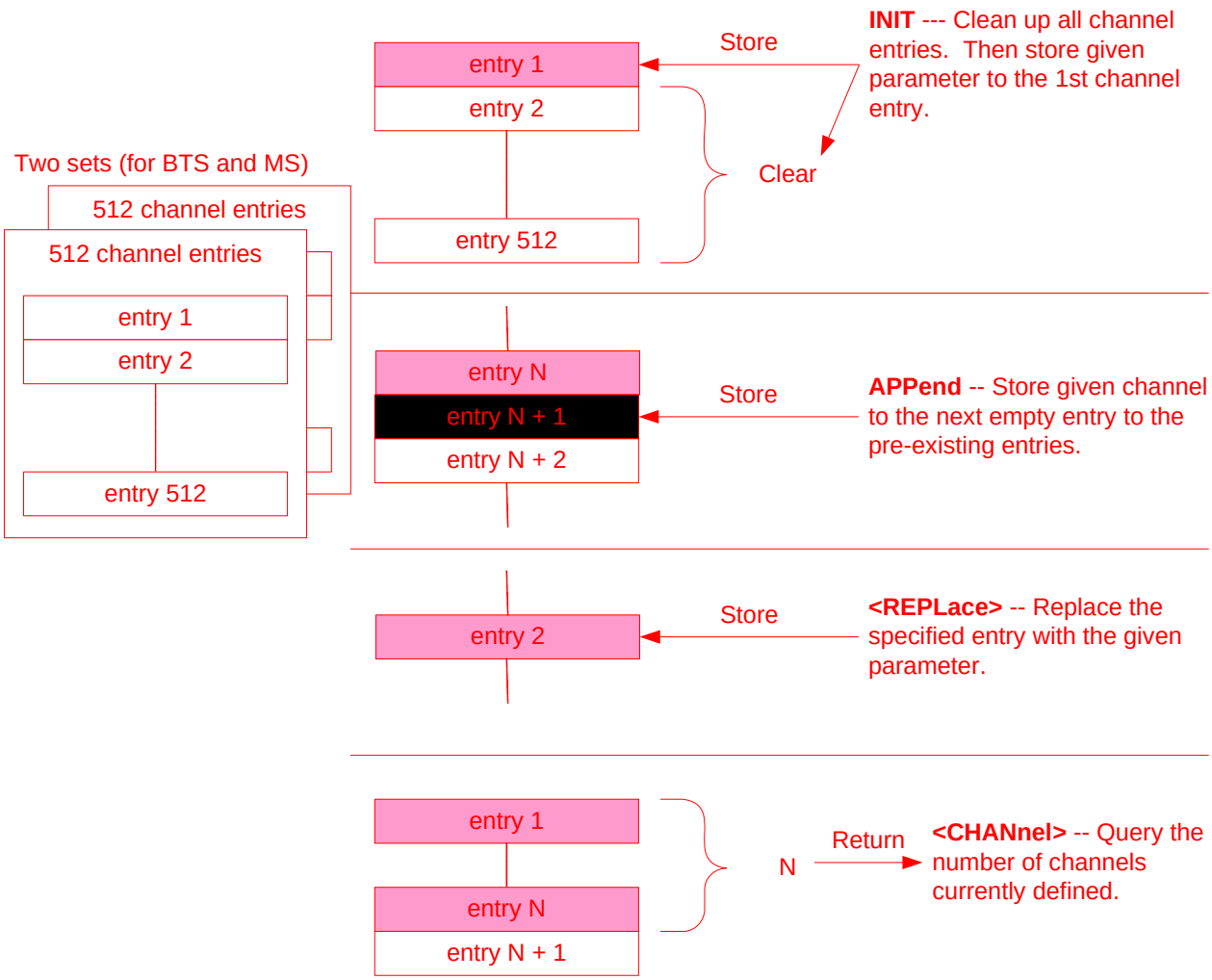
- AUTO – Select this feature to set the symbol boundary detection to the automatic mode. Various code channels are measured and the most appropriate code channel is selected as the reference channel.
- CUSTom – Select this feature to specify a customized list of active channels using a remote command. All specified channels are considered as active.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SBOundary:MS AUTO|CUSTom` `[:SENSe]:CWCDma:RHO:SBOundary:MS?`
Example	CWCD:RHO:SBO:MS CUST CWCD:RHO:SBO:MS?
Notes	This parameter is effective when [:SENSe]:RADio:DEVice is set to MS.
Preset	AUTO
State Saved	Saved in instrument state.
Range	Auto | Custom
Initial S/W Revision	Prior to A.02.00

Custom Active Channel List MS [MS only]

The following commands handle the list of custom predefined channels for MS.

- INIT – Cleans up all channel entries. Then stores given parameter to the 1st channel entry. See “Initialize List (Remote Command Only)” on page 202.
- APPend – Stores the given channel to the next empty entry of the pre-existing entries. See “Append List (Remote Command Only)” on page 204.
- REPLace - Replaces the specified entry with the given parameter. See “Replace List (Remote Command Only)” on page 207.
- CHANnel – Queries the information of the channel specified by the entry id. See “Query List (Remote Query Only)” on page 210.
- NCHannel - Queries the number of channels currently defined. See “Number of Entries (Remote Query Only)” on page 213.


Two sets (for BTS and MS)
512 channel entries
512 channel entries
entry 1
entry 2
entry 512
entry 1
entry 2
entry 512
Store
Clear
INIT --- Clean up all channel entries. Then store given parameter to the 1st channel entry.
entry N
entry N + 1
entry N + 2
Store
APPend -- Store given channel to the next empty entry to the pre-existing entries.
entry 2
Store
<REPLace> -- Replace the specified entry with the given parameter.
entry 1
entry N
entry N + 1
N
Return
<CHANnel> -- Query the number of channels currently defined.

Initialize List (Remote Command Only)

Initializes the current custom active channel list. This creates a new entry with the given parameter.

1st parameter:

<symbol_rate>	Specifies symbol rate of the channel.

2nd parameter:

<code_num>	Specifies spreading code of the channel.

3rd parameter:

IPH	Specifies the channel is on the I-axis.
QPH	Specifies the channel Is on the Q-axis.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SBOundary:LIST:MS:INIT <symbol_rate>, <code_num>, IPH|QPH`
Example	In order to predefine the following channels: - DPCCH (C8(0):Q) - DPDCH (C6(16):I) CWCD:RHO:SBO:LIST:MS:INIT 15000,0,QPH CWCD:RHO:SBO:LIST:MS:APP 60000,16,IPH CWCD:RHO:SBO:LIST:NCH:MS? 2 CWCD:RHO:SBO:LIST:MS:CHAN? 1 15000,0,QPH CWCD:RHO:SBO:LIST:MS:CHAN? 2 60000,16,IPH

Notes

(1) This command is effective if [:SENSe]:RADio:DEVice is set to MS and [:SENSe]:CWCDma:RHO:SBOundary:MS is set to CUSTom.

(2) symbol_rate = 1920000 is available if HSDPA/HSUPA Enable is On.

(3) The maximum number of entries is 512.

One of the following error messages is logged if the given parameter is invalid. (If an error is reported, the SCPI command is rejected and the instrument's settings do not change.)

(1) "Missing Parameter"

This error is reported if the number of parameters is less than 3.

For example,

:SENSe:CWCDma:RHO:SBOundary:LIST:MS:INIT 15000, 0 <– 3rd parameter is missing.

(2) "Illegal parameter value"

This error is reported if parameter type is invalid or if enum value is invalid. For example,

:SENSe:CWCDma:RHO:SBOundary:LIST:MS:INIT 15000, ON, QPH <– 2nd parameter must be integer.

:SENSe:CWCDma:RHO:SBOundary:LIST:MS:INIT 15001, 0, QPH <– 1st parameter value (Symbol Rate) is not allowed.

Only the values given in the Range field are valid for the Symbol Rate. You may specify these in numeric form, but they are interpreted as an enumeration and the error results if the value does not translate to one in the list.

(3) "Data out of range"

This error is reported if parameter value is out of range.

For example,

:SENSe:CWCDma:RHO:SBOundary:LIST:MS:INIT 15000, 256, QPH <– 2nd parameter is out of range.

(4) "Setting Conflict"

This error is reported if the given code channel overlaps another code channel in modulation Accuracy.

For example, if a user sends the following two commands, the second command causes the error message because C7(0):Q overlaps C8(0):Q.

:SENSe:CWCDma:RHO:SBOundary:LIST:MS:INIT 15000, 0, QPH <- OK

:SENSe:CWCDma:RHO:SBOundary:LIST:MS:APPend 30000, 0, QPH <- C7(0):Q overlaps C8(0):Q

State Saved	Saved in instrument state.
Range	symbol_rate = 15000 | 30000 | 60000 | 120000 | 240000 | 480000 | 960000 | 19200000 0<= code_num <= 255 if symbol_rate = 15000 0<= code_num <= 127 if symbol_rate = 30000 0<= code_num <= 63 if symbol_rate = 60000 0<= code_num <= 31 if symbol_rate = 120000 0<= code_num <= 15 if symbol_rate = 240000 0<= code_num <= 7 if symbol_rate = 480000 0<= code_num <= 3 if symbol_rate = 960000 0<= code_num <= 1 if symbol_rate = 1920000
Initial S/W Revision	Prior to A.02.00

Append List (Remote Command Only)

Appends the entry to the custom active channel list.

1st parameter:

<symbol_rate>	Specifies symbol rate of the channel.

2nd parameter:

<code_num>	Specifies spreading code of the channel.

3rd parameter:

IPH	Specifies the channel is on the I-axis.
QPH	Specifies the channel Is on the Q-axis.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SBOundary:LIST:MS:APPend <symbol_rate>, <code_num>, IPH|QPH`

Example

In order to predefine the following channels:

- DPCCH (C8(0):Q)

- DPDCH (C6(16):I)

CWCD:RHO:SBO:LIST:MS:INIT 15000,0,QPH

CWCD:RHO:SBO:LIST:MS:APP 60000,16,IPH

CWCD:RHO:SBO:LIST:NCH:MS?

2

CWCD:RHO:SBO:LIST:MS:CHAN? 1

15000,0,QPH

CWCD:RHO:SBO:LIST:MS:CHAN? 2

60000,16,IPH

Notes

(1) This command is effective if [:SENSe]:RADio:DEVice is set to MS and [:SENSe]:CWCDma:RHO:SBOundary:MS is set to CUSTom.

(2) symbol_rate = 1920000 is available if HSDPA/HSUPA Enable is On.

(3) The maximum number of entries is 512.

One of the following error messages is logged if the given parameter is invalid. (If an error is reported, the SCPI command is rejected and the instrument's settings do not change.)

(1) "Missing Parameter"

This error is reported if the number of parameters is less than 3.

For example,

:SENSe:CWCDma:RHO:SBOundary:LIST:MS:APPend 15000, 0 <– 3rd parameter is missing.

(2) "Illegal parameter value"

This error is reported if parameter type is invalid or if enum value is invalid. For example,

:SENSe:CWCDma:RHO:SBOundary:LIST:MS:APPend 15000, ON, QPH <– 2nd parameter must be integer.

:SENSe:CWCDma:RHO:SBOundary:LIST:MS:APPend 15001, 0, QPH <– 1st parameter value (Symbol Rate) is not allowed.

Only the values given in the Range field are valid for the Symbol Rate. You may specify these in numeric form, but they are interpreted as an enumeration and the error results if the value does not translate to one in the list.

(3) "Data out of range"

This error is reported if parameter value is out of range.

For example,

:SENSe:CWCDma:RHO:SBOundary:LIST:MS:APPend 15000, 256, QPH <– 2nd parameter is out of range.

(4) "Setting Conflict"

This error is reported if the given code channel overlaps another code channel in modulation accuracy.

For example, if a user sends the following two commands, the second command causes the error message because C7(0):Q overlaps C8(0):Q.

:SENSe:CWCDma:RHO:SBOundary:LIST:MS:INIT 15000, 0, QPH <- OK

:SENSe:CWCDma:RHO:SBOundary:LIST:MS:APPend 30000, 0, QPH <- C7(0):Q overlaps C8(0):Q

State Saved	Saved in instrument state.
Range	symbol_rate = 15000 | 30000 | 60000 | 120000 | 240000 | 480000 | 960000 | 19200000 0<= code_num <= 255 if symbol_rate = 15000 0<= code_num <= 127 if symbol_rate = 30000 0<= code_num <= 63 if symbol_rate = 60000 0<= code_num <= 31 if symbol_rate = 120000 0<= code_num <= 15 if symbol_rate = 240000 0<= code_num <= 7 if symbol_rate = 480000 0<= code_num <= 3 if symbol_rate = 960000 0<= code_num <= 1 if symbol_rate = 1920000
Initial S/W Revision	Prior to A.02.00

Replace List (Remote Command Only)

Replaces an entry in the custom active channel list.

1st parameter:

<entry_id>	Specifies entry ID of the channel to replace.

2nd parameter:

<symbol_rate>	Specifies symbol rate of the channel.

3rd parameter:

<code_num>	Specifies spreading code of the channel.

4th parameter:

IPH	Specifies the channel is on the I-axis.
QPH	Specifies the channel Is on the Q-axis.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SBOundary:LIST:MS:REPLace <entry_id>,<symbol_rate>, <code_num>, IPH|QPH`

Example

In order to predefine the following channels:

- DPCCH (C8(0):Q)

- DPDCH (C6(16):I)

Send the following sequence:

CWCD:RHO:SBO:LIST:MS:INIT 15000,0,QPH

CWCD:RHO:SBO:LIST:MS:APP 60000,16,IPH

CWCD:RHO:SBO:LIST:NCH:MS?

2

And, replace 2nd entry.

CWCD:RHO:SBO:LIST:MS:REPL 2,60000,17,QPH

CWCD:RHO:SBO:LIST:MS:CHAN? 1

15000,0,QPH

CWCD:RHO:SBOundary:LIST:MS:CHANnel? 2

60000,17,IPH

Notes

(1) This command is effective if [:SENSe]:RADio:DEVice is set to MS and [:SENSe]:CWCDma:RHO:SBOundary:MS is set to CUSTom.

(2) symbol_rate = 1920000 is available if HSDPA/HSUPA Enable is On.

(3) The maximum number of entries is 512.

One of the following error messages is logged if the given parameter is invalid. (If an error is reported, the SCPI command is rejected and the instrument's settings do not change.

(1) "Missing Parameter"

This error is reported if the number of parameters is less than 4. For example,

:SENSe:CWCDma:RHO:SBOundary:LIST:MS:REPLace 1,15000, 0 <– 4th parameter is missing.

(2) "Illegal parameter value"

This error is reported if parameter type is invalid or if enum value is invalid. For example,

:SENSe:CWCDma:RHO:SBOundary:LIST:MS: REPLace 1,15000, ON, QPH <– 3rd parameter must be integer.

:SENSe:CWCDma:RHO:SBOundary:LIST:MS:REPLace 1,15001, 0, QPH <– 2nd parameter value (Symbol Rate) is not allowed.
Only the values given in the Range field are valid for the Symbol Rate. You may specify these in numeric form, but they are interpreted as an enumeration and the error results if the value does not translate to one in the list.

(3) "Data out of range"

This error is reported if parameter value is out of range. For example,

:SENSe:CWCDma:RHO:SBOundary:LIST:MS:APPend 15000, 256, QPH <– 3rd parameter is out of range.

(4) "Setting Conflict"

This error is reported if the given code channel overlaps another code channel in modulation accuracy.

For example, if a user sends the following two commands, the second command causes the error message because C7(0):Q overlaps C8(0):Q.

:SENSe:CWCDma:RHO:SBOundary:LIST:MS:INIT 15000, 0, QPH <- OK

:SENSe:CWCDma:RHO:SBOundary:LIST:MS: REPLace 1,30000, 0, QPH <- C7(0):Q overlaps C8(0):Q

(5) The entry ID out of range

1 <= entry_id <= The number of entries which is currently appended.

State Saved	Saved in instrument state.
Range	The entry ID must be: 1 <= entry_id <= The number of entries which is currently appended. symbol_rate = 15000 | 30000 | 60000 | 120000 | 240000 | 480000 | 960000 | 19200000 0<= code_num <= 255 if symbol_rate = 15000 0<= code_num <= 127 if symbol_rate = 30000 0<= code_num <= 63 if symbol_rate = 60000 0<= code_num <= 31 if symbol_rate = 120000 0<= code_num <= 15 if symbol_rate = 240000 0<= code_num <= 7 if symbol_rate = 480000 0<= code_num <= 3 if symbol_rate = 960000 0<= code_num <= 1 if symbol_rate = 1920000
Initial S/W Revision	Prior to A.02.00

Query List (Remote Query Only)

This command returns the entry of the custom active channel list.

1st parameter:

<entry_id> Specifies entry ID of the channel to query

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SBOundary:LIST:MS:CHANnel? <entry_id>`

Example

To predefine the following channels:

- DPCCH (C8(0):Q)
- DPDCH (C6(16):I)

Send command sequence:

CWCD:RHO:SBO:LIST:MS:INIT 15000,0,QPH

CWCD:RHO:SBO:LIST:MS:APP 60000,16,IPH

CWCD:RHO:SBO:LIST:NCH:MS?

2

CWCD:RHO:SBO:LIST:MS:CHAN? 1

15000, 0, QPH

CWCD:RHO:SBO:LIST:MS:CHAN? 2

60000, 16, IPH

Notes	(1) This command is effective if [:SENSe]:RADio:DEVice is set to MS and [:SENSe]:CWCDma:RHO:SBOundary:MS is set to CUSTom. (2) symbol_rate = 1920000 is available if HSDPA/HSUPA Enable is On. (3) The maximum number of entries is 512. Default value of the parameter By default, one channel is defined. (DPCCH C8(0):Q) In order to query the default entry, specify 1 for <entry_id>: :SENSe:CWCDma:RHO:SBOundary:LIST:MS:CHANnel? 1 The instrument returns an array of three values: 15000, 0, QPH The <entry_id> parameter is always required for the query. The range of the parameter is from 1 to the total number of channels you have defined. For example, if you have defined two channels, you can query them as follows: :SENSe:CWCDma:RHO:SBOundary:LIST:MS:CHANnel? 1 :SENSe:CWCDma:RHO:SBOundary:LIST:MS:CHANnel? 2 If you want to know the number of channels you have defined, send the following query command: :SENSe:CWCDma:RHO:SBOundary:LIST:NCHannels:MS? The following error message is logged if the given parameter is invalid: If an error is reported, the SCPI command is rejected and the instrument's settings do not change. <entry_id> out of range The entry ID must be: 1 <= entry_id <= The number of entries which is currently appended.
Preset	15000, 0, QPH
State Saved	Saved in instrument state.
Range	The entry ID must be: 1 <= entry_id <= The number of entries which is currently appended.
Initial S/W Revision	Prior to A.02.00

Number of Entries (Remote Query Only)

Returns the number of entries in the custom predefined active channel list MS. This command is query only.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SBOundary:LIST:MS:NCHannels?`
Example	CWCD:RHO:SBO:LIST:MS:NCH?
Notes	This command is effective when [:SENSe]:RADio:DEVice is set to MS and [:SENSe]:CWCDma:RHO:SBOundary:MS is set to CUSTom. This command is a query-only command.
Preset	1
State Saved	No
Initial S/W Revision	Prior to A.02.00

Sync Start Slot (Remote Command Only)

Specifies the slot number to measure as the first slot. You can then use any trigger, even Free Run to get the measurement result beginning with the specified slot number. For example, if the Sync Start Slot state is set to On and the start slot number is 0, then the synchronization always starts from slot number 0 regardless of the trigger type and its delay.

If Sync Start Slot state is set to Off, the measurement performs synchronization at any slot found immediately after the trigger timing.

Mode	WCDMA

Remote Command	`[:SENSe]:CWCDma:RHO:SSLot:NUMBer <integer>`
	`[:SENSe]:CWCDma:RHO:SSLot:NUMBer?`
	`[:SENSe]:CWCDma:RHO:SSLot[:STATe] OFF|ON|0|1`
	`[:SENSe]:CWCDma:RHO:SSLot[:STATe]?`

Example	CWCD:RHO:SSL:NUMB 5 CWCD:RHO:SSL:NUMB? CWCD:RHO:SSL:STAT ON CWCD:RHO:SSL:STAT?
Notes	Turn first slot number detection mode on or off.
Preset	0 OFF
State Saved	Saved in instrument state.
Range	0 to 14

Initial S/W Revision	Prior to A.02.00

Transient Period Exclude (Remote Command Only)

Selects either to include or to exclude the transient period. The transient period is specified in the 3GPP standard TS 34.121, as 25 µs before each slot boundary and 25 µs after each slot boundary. The 3GPP standard requires that the transient period is not included for the power measurement.

This command is available only when the device is MS.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SWEep:TIME:TRANsient INCLude|EXCLude` `[:SENSe]:CWCDma:RHO:SWEep:TIME:TRANsient?`
Example	CWCD:RHO:SWE:TIME:TRAN INCL CWCD:RHO:SWE:TIME:TRAN?
Preset	INCLude
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Spectrum (Remote Command Only)

Sets spectrum to either normal or inverted for demodulation related measurements. If set to `INVert`, the upper and lower spectrums are swapped.

The `INVert` function conjugates the spectrum, which is equivalent to taking the negative of the quadrature component in demodulation. The correct setting (`NORMal` or `INVert`) depends on whether the signal at the input of the instrument has a high or low side mix.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:SPECtrum INVert|NORMal` `[:SENSe]:CWCDma:RHO:SPECtrum?`
Example	CWCD:RHO:SPEC INV CWCD:RHO:SPEC?
Preset	NORMal
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

EVM Result I/Q Offset (Remote Command Only)

Toggles the I/Q origin offset function between Std (standard) and Exclude.

- Std: The measurement results for EVM, Rho, and Modulation Accuracy (Rho) error take into account the I/Q origin offset.
- Exclude: The measurement results for EVM, Rho, and Modulation Accuracy (Rho) error do not take into account the I/Q origin offset, and the message “EVM excludes I/Q Offset” is displayed in the lower right-hand graph display area.

Mode	WCDMA
Remote Command	`:CALCulate:CWCDma:RHO:IQOFfset:INCLude OFF|ON|0|1`
	`:CALCulate:CWCDma:RHO:IQOFfset:INCLude?`
Example	CALC:CWCD:RHO:IQOF:INCL ON
	CALC:CWCD:RHO:IQOF:INCL?
Preset	ON
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Active Set Threshold (Remote Command Only)

Toggles the active channel identification function between Auto and Man. If set to Auto, the active channels are determined automatically by the internal algorithm. If set to Man, the active channel identification is determined by a user definable threshold ranging from 0.00 dB to –100.00 dB.

Mode	WCDMA
Remote Command	`:CALCulate:CWCDma:RHO:ASET:THReshold <rel_ampl>`
	`:CALCulate:CWCDma:RHO:ASET:THReshold?`
	`CALCulate:CWCDma:RHO:ASET:THReshold:AUTO OFF|ON|0|1`
	`CALCulate:CWCDma:RHO:ASET:THReshold:AUTO?`
Example	CALC:CWCD:RHO:ASET:THR –20.0
	CALC:CWCD:RHO:ASET:THR?
	CALC:CWCD:RHO:ASET:THR:AUTO ON
	CALC:CWCD:RHO:ASET:THR:AUTO?

Notes	This command is effective when [:SENSe]:CWCDma:RHO:SBOundary[:BTS] is set to AUTO. (For MS, this command is always effective.) Turn the automatic mode On or Off, for the active channel identification function. • OFF – The active channel identification for each code channel is determined by a value set by CALCulate:CWCDma:RHO:ASET:THReshold. • ON – The active channels are determined automatically by the internal algorithm.
Preset	0.0 ON
State Saved	Saved in instrument state.
Min	–100.0
Max	0.0
Initial S/W Revision	Prior to A.02.00

Chip Rate (Remote Command Only)

Sets the chip rate.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:CRATe <freq>` `[:SENSe]:CWCDma:RHO:CRATe?`
Example	CWCD:RHO:CRAT 3900000 CWCD:RHO:CRAT?
Preset	3.84 MHz
State Saved	Saved in instrument state.
Min	3.456 MHz
Max	4.224 MHz
Initial S/W Revision	Prior to A.02.00

DTX/Burst Detect (Remote Command Only)

For downlink signals, detects the power burst for either “CM” (Compressed Mode) or “DTX”. In the case of “Compressed Mode”, both I and Q symbol power are set to Off. In the case of “DTX”, either I or Q symbol power, or both, can be set to Off.

For uplink signals, this function detects the HS-DPCCH burst, the subframe of which does not align with the DPCCH slot boundary.

Mode	WCDMA
Remote Command	`:CALCulate:CWCDma:RHO:DTXBurst 0|1|OFF|ON` `:CALCulate:CWCDma:RHO:DTXBurst?`
Example	CALC:CWCD:RHO:DTXB ON CALC:CWCD:RHO:DTXB?
Notes	If the HSDPA/HSUPA option is enabled, this parameter is active and effective for both uplink and downlink. If the HSDPA/HSUPA option is disabled, this parameter is active and effective only for downlink.
Preset	OFF
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

PICH Code Number (Remote Command Only)

Specifies the code number for PICH, which contains the DTX (no transmission) part. PICH has 300 bits in 1 radio frame, but the last 12 bits are not transmitted. Then, PICH needs special handling to measure code domain power. The PICH Code Number enables you to specify which code channel should be set as PICH.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:PICH:SPRead <integer>` `[:SENSe]:CWCDma:RHO:PICH:SPRead?`
Example	CWCD:RHO:PICH:SPR 16 CWCD:RHO:PICH:SPR?
Notes	(1) If PICH Code Number and MICH Code Number are the same, the channel is considered as PICH. (2) This parameter is active for BTS. (3) This parameter is meaningful only if the Symbol Boundary setting is Auto.
Preset	16
State Saved	Saved in instrument state.
Min	0
Max	255
Initial S/W Revision	Prior to A.02.00

MICH Code Number [BTS only] (Remote Command Only)

Specifies the code number for MICH (MBMS Indicator channel), which contains the DTX (no transmission) part. MICH has 300 bits in 1 radio frame, but the last 6 symbols (12 bits) are not transmitted. Therefore, MICH needs special handling to measure code domain power. The MICH Code Number specifies which code channel should be considered as MICH.

Since MICH is an optional channel, the parameter has a BAF setting (On|Off).

NOTE Active ID auto-detection is performed. However, the result can be 7.5ksps channel if MICH's two consecutive demod bits are the same. If this occurs, these 7.5ksps channels are automatically set to be 15ksps channels.

Mode	WCDMA

Remote Command	`[:SENSe]:CWCDma:RHO:MICH:SPRead <integer>`
	`[:SENSe]:CWCDma:RHO:MICH:SPRead?`
	`[:SENSe]:CWCDma:RHO:MICH:STATe OFF|ON|0|1`
	`[:SENSe]:CWCDma:RHO:MICH:STATe?`

Example	CWCD:RHO:MICH:SPR 4 CWCD:RHO:MICH:SPR? CWCD:RHO:MICH:STAT ON CWCD:RHO:MICH:STAT?
Notes	(1) If the PICH Code Number and MICH Code Number are the same, the channel is considered as PICH. (2) This parameter is active for BTS. (3) This parameter is meaningful only if Symbol Boundary setting is Auto. This parameter enables or disables MICH code number setting.
Preset	2 OFF
State Saved	Saved in instrument state.
Min	2
Max	255
Initial S/W Revision	Prior to A.02.00

Timing Estimation (Remote Command Only)

Selects between channel-by-channel and global timing estimation functions for MMSE.

- Channel-by-Channel: The code channels are estimated using individual timing. This function takes longer.
- Global: The individual code channels are estimated using global timing. This function takes less time.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:MCEStimator:TIMing CHANnel|GLOBal` `[:SENSe]:CWCDma:RHO:MCEStimator:TIMing?`
Example	CWCD:RHO:MCES:TIM CHAN CWCD:RHO:MCES:TIM?
Preset	GLOBal
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Multi Channel Estimator (Remote Command Only)

Allows you to toggle the multi channel estimator function for MMSE between On and Off.

- On: The individual code channels are aligned to the pilot channel to improve the phase error (whether each code phase is aligned or not). This takes a longer time.
- Off: The phase information is computed from one coded signal only. (The phase of each code channel needs to be aligned to the pilot channel.) This operation is briefer.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:MCEStimator OFF|ON|0|1` `[:SENSe]:CWCDma:RHO:MCEStimator?`
Example	CWCD:RHO:MCES ON CWCD:RHO:MCES?
Preset	OFF
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Frequency Error Tolerance Range (Remote Command Only)

Specifies the frequency error tolerance range as one of the following:

- **Normal** - provides a more stringent range of frequency tolerance, which is useful when you want to accurately demodulate signals of higher complexity. For example, when composite channels are modulated on the same signal, the modulation is complex, and frequency error is critical to correct demodulate. In the case of demodulating complex signals, set to ‘Normal’

- **Wide** - provides a wider, and less stringent range of frequency error tolerance.

This parameter is valid only when the device type is MS (Uplink).

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:RHO:FERRor:TRANge WIDE|NORMal` `[:SENSe]:CWCDma:RHO:FERRor:TRANge?`
Example	CWCD:RHO:FERR:TRAN WIDE CWCD:RHO:FERR:TRAN?
Couplings	No
Preset	NORMal
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

QPSK EVM Related Setting Commands

The following commands and queries relate to the QPSK EVM measurement:

Measurement Enable/Disable (Remote Command Only)

QPSK EVM Calculation Length (Remote Command Only)

QPSK EVM Calculation Offset (Remote Command Only)

QPSK EVM Result Selection (Remote Command Only)

EVM Result I/Q Offset (QPSK EVM) (Remote Command Only)

Chip Rate (QPSK EVM) (Remote Command Only)

Measurement Enable/Disable (Remote Command Only)

Allows you to enable or disable QPSK EVM measurement.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:EVMQpsk[:ENABle] OFF|ON|0|1` `[:SENSe]:CWCDma:EVMQpsk[:ENABle]?`
Example	CWCD:EVMQ ON CWCD:EVMQ?
Preset	OFF
State Saved	Saved in instrument state.
Range	On|Off
Initial S/W Revision	Prior to A.02.00

QPSK EVM Calculation Length (Remote Command Only)

Sets calculation length of QPSK EVM measurement.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:EVMQpsk:SWEep:LENGth <time>` `[:SENSe]:CWCDma:EVMQpsk:SWEep:LENGth?`
Example	CWCD:EVMQ:SWE:LENG 1ms CWCD:EVMQ:SWE:LENG?
Preset	1.333334ms
State Saved	Saved in instrument state.
Min	66.667us
Max	2.666667ms
Initial S/W Revision	Prior to A.02.00

QPSK EVM Calculation Offset (Remote Command Only)

Sets calculation offset of QPSK EVM measurement. The first part of a step can be affected by a frequency hopping. Specified length of the first portion is discarded if non-zero value is set.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:EVMQpsk:SWEep:OFFSet <time>` `[:SENSe]:CWCDma:EVMQpsk:SWEep:OFFSet?`
Example	CWCD:EVMQ:SWE:OFFS 100us CWCD:EVMQ:SWE:OFFS?
Preset	0.0
State Saved	Saved in instrument state.
Min	0.0
Max	22.155533ms
Initial S/W Revision	Prior to A.02.00

QPSK EVM Result Selection (Remote Command Only)

Sets the composition of QPSK EVM result block in scalar results. If an item is disabled (off), the item is not shown and not contained in remote results.

The number and the order of this list correspond to QPSK EVM result block in remote result (n = 1).

Mode	WCDMA

Remote Command	[:SENSe]:CWCDma:EVMQpsk:RESult ON|OFF|0|1,… [:SENSe]:CWCDma:EVMQpsk:RESult?
Example	CWCD:EVMQ:RES 1,0,0,0,0,0 CWCD:EVMQ:RES?
Preset	1,1,1,1,1,1
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

EVM Result I/Q Offset (QPSK EVM) (Remote Command Only)

Toggles the I/Q origin offset function between Std (standard) and Exclude.

- **Std**: The measurement results for EVM, Rho, and Modulation Accuracy (Rho) error take into account the I/Q origin offset.
- **Exclude**: The measurement results for EVM, Rho, and Modulation Accuracy (Rho) error do not take into account the I/Q origin offset, and the message “EVM excludes I/Q Offset” is displayed in the lower right-hand graph display area.

Mode	WCDMA
Remote Command	:CALCulate:CWCDma:EVMQpsk:IQOFfset:INCLude OFF|ON|0|1 :CALCulate:CWCDma:EVMQpsk:IQOFfset:INCLude?
Example	CALC:CWCD:EVMQ:IQOF:INCL ON CALC:CWCD:EVMQ:IQOF:INCL?
Preset	ON
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Chip Rate (QPSK EVM) (Remote Command Only)

Sets the chip rate.

Mode	WCDMA
Remote Command	[:SENSe]:CWCDma:EVMQpsk:CRATe <freq> [:SENSe]:CWCDma:EVMQpsk:CRATe?
Example	CWCD:EVMQ:CRAT 3900000 CWCD:EVMQ:CRAT?
Preset	3.84 MHz

State Saved	Saved in instrument state.
Min	3.456 MHz
Max	4.224 MHz
Initial S/W Revision	Prior to A.02.00

ACP Related Setting Commands

The following commands and queries relate to the ACP measurement:

Measurement Enable/Disable (Remote Command Only)

ACP Calculation Length (Remote Command Only)

ACP Calculation Offset (Remote Command Only)

ACP Result Selection (Remote Command Only)

FFT Length (Remote Command Only)

Measurement Enable/Disable (Remote Command Only)

Allows you to enable or disable ACP measurement.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:ACPower[:ENABle] OFF|ON|0|1` `[:SENSe]:CWCDma:ACPower[:ENABle]?`
Example	CWCD:ACP OFF CWCD:ACP?
Preset	ON
State Saved	Saved in instrument state.
Range	On|Off
Initial S/W Revision	Prior to A.02.00

ACP Calculation Length (Remote Command Only)

Sets calculation length of ACP measurement.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:ACPower:SWEep:LENGth <time>` `[:SENSe]:CWCDma:ACPower:SWEep:LENGth?`
Example	CWCD:ACP:SWE:LENG 1ms CWCD:ACP:SWE:LENG?

Preset	91.023us
State Saved	Saved in instrument state.
Min	22.756us
Max	8.738134ms
Initial S/W Revision	Prior to A.02.00

ACP Calculation Offset (Remote Command Only)

Sets calculation offset of ACP measurement. The first part of a step can be affected by a frequency hopping. Specified length of the first portion is discarded if non-zero value is set.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:ACPower:SWEep:OFFSet <time>` `[:SENSe]:CWCDma:ACPower:SWEep:OFFSet?`
Example	CWCD:ACP:SWE:OFFS 100us CWCD:ACP:SWE:OFFS?
Preset	0.0
State Saved	Saved in instrument state.
Min	0.0
Max	22.199444ms
Initial S/W Revision	Prior to A.02.00

ACP Result Selection (Remote Command Only)

Sets the composition of ACP result block in scalar results. If an item is disabled (off), the item is not shown and not contained in remote results.

The number and the order of this list correspond to ACP result block in remote result (n = 1).

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:ACPower:RESult ON|OFF|0|1,…` `[:SENSe]:CWCDma:ACPower:RESult?`
Example	CWCD:ACP:RES 1,0,0,0,0 CWCD:ACP:RES?
Preset	1,1,1,1,1,0,0,0,0
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

FFT Length (Remote Command Only)

Sets the FFT length.

Mode	WCDMA
Remote Command	`[:SENSe]:CWCDma:ACPower:FFT:LENGth <integer>` `[:SENSe]:CWCDma:ACPower:FFT:LENGth?`
Example	CWCD:ACP:FFT:LENG 1024 CWCD:ACP:FFT:LENG?
Notes	This function is available when Meas Method is SINGle or LIST.
Preset	4096
State Saved	Saved in instrument state.
Min	256
Max	131072
Initial S/W Revision	Prior to A.02.00

Meas Preset (Remote Command Only)

Restores all measurement parameters to their default values.

For details, see “Meas Preset” under the “Meas Setup” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Mode	WCDMA
Remote Command	`:CONFigure:CWCDma`
Example	CONF:CWCD
Initial S/W Revision	Prior to A.02.00

Mode

Operation of this key is identical across all measurements.

For details, see the “Mode” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

Mode Setup

Operation of this key is identical across all measurements.

For details, see the “Mode Setup” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

Peak Search

There is no Peak Search functionality implemented for this measurement, so, when pressed, this key displays a blank menu.

Key Path	**Front-panel key**

Recall

Operation of this key is identical across all measurements.

For details, see the “Recall” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

Restart

Operation of this key is identical across all measurements.

For details, see the “Restart” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

Save

Operation of this key is identical across all measurements.

For details, see the “Save” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

Single (Single Measurement/Sweep)

Operation of this key is identical across all measurements.

For details, see the “Single” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

Source

Operation of this key is identical across all measurements.

For details, see the “Source” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

SPAN X Scale

There is no Span X Scale functionality implemented for this measurement, so, when pressed, this key displays a blank menu.

Key Path	**Front-panel key**

Sweep/Control

There is no measurement-specific Sweep/Control functionality, so, when pressed, this key displays a blank menu.

For information about keys and commands associated with sweep control, such as **Single**, **Cont**, **Restart**, **Pause/Resume** and ABORt, see the respective sections of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User's & Programmer's Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

Trace/Detector

There are no menu keys available in Trace/Detector menu: the menu is blank.

Key Path	**Front-panel key**

Trigger

There are no menu keys available in Trigger menu: the menu is blank.

Key Path	**Front-panel key**

View/Display

The View/Display menu provides access to available view selections and their controls. This menu also includes the **Display** key, which opens a submenu that allows you to modify display settings.

View Selections

There are 3 available view types:

"Measurement List (View)" on page 239

"Parameter List (View)" on page 240

"Result Metrics (View)" on page 242

For details of Remote Commands for view selection, see "View Selection Remote Commands" on page 242.

Key Path	**Front-panel key**

Display

For details of the functionality associated with this key (except for "Change Title" on page 238 under the Title menu), see "Display" under the "View/Display" section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User's & Programmer's Reference, or the corresponding section of the online Help.

Key Path	**View/Display**

Title

For details of the keys in this menu (except for "Change Title" on page 238 below), see "Title" under the "View/Display > Display" section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User's & Programmer's Reference, or the corresponding section of the online Help.

Key Path	**View/Display, Display**

Change Title

Accesses an Alpha Editor menu that enables you to write a title across the top of the display.

For more details, see "Change Title" under the "View/Display > Display > Title" section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User's & Programmer's Reference, or the corresponding section of the online Help.

Key Path	**View/Display, Display, Title**
Mode	WCDMA
Remote Command	`:DISPlay:CWCDma:ANNotation:TITLe:DATA <string>` `:DISPlay:CWCDma:ANNotation:TITLe:DATA?`

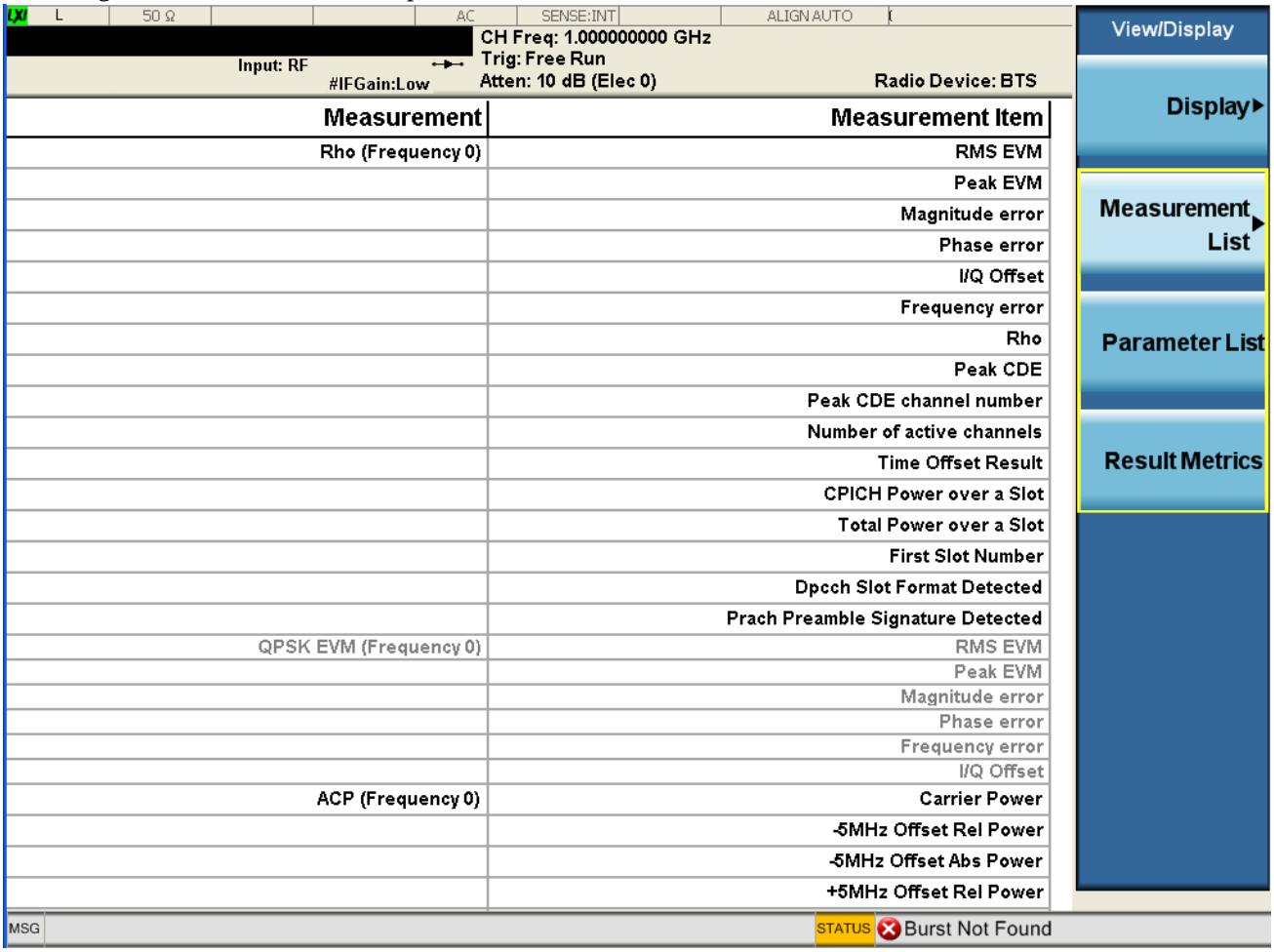
Example	DISP:CWCD:ANN:TITL:DATA “Combined WCDMA” DISP:CWCD:ANN:TITL:DATA?
Preset	Combined WCDMA
State Saved	Saved in instrument state.
Range	Uppercase, Lowercase, Numeric, Symbol
Initial S/W Revision	Prior to A.02.00

Measurement List (View)

By default, this view shows the current status of enabled measurements and items.

If the “Show All Items” parameter is enabled via its softkey, all available measurements and items are displayed. When the measurement is disabled, measurement name and items that belong to the measurement are grayed out.

The figure below shows an example of the Measurement List View.



Key Path **View/Display**

Show All Items

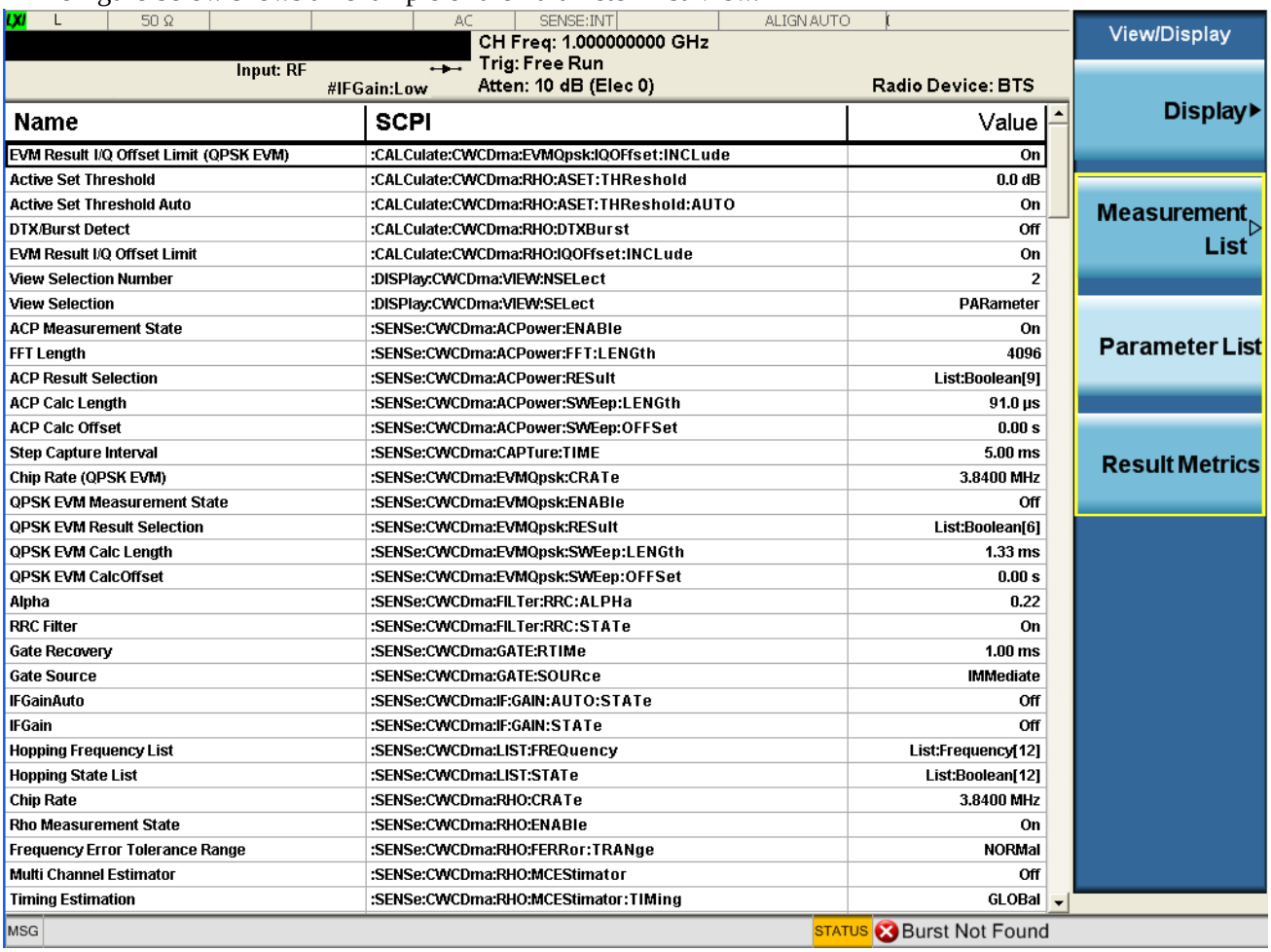
Allows you to specify display settings of the Measurement List view. By default (OFF), the current status of enabled measurements and items are displayed.

Key Path	**View/Display, Measurement List**
Mode	WCDMA
Notes	No remote command, only menu key is available.
Preset	OFF
State Saved	Saved in instrument state.
Range	On|Off
Initial S/W Revision	Prior to A.02.00

Parameter List (View)

This view shows the name, remote command and value of available commands for this measurement. The user can verify and change values by using menu and front panel keys.

The figure below shows an example of the Parameter List View.



Key Path	**View/Display**

Index

Allows you to specify an index of array for editing the value of specified index. This key only appears when a list type of SCPI is selected on Parameter List view. The maximum value of this index corresponds to the length of selected SCPI.

Key Path	**View/Display, Parameter List**
Mode	GSM
Initial S/W Revision	Prior to A.02.00

Value

Allows you to edit the value of selected SCPI on Parameter List view.

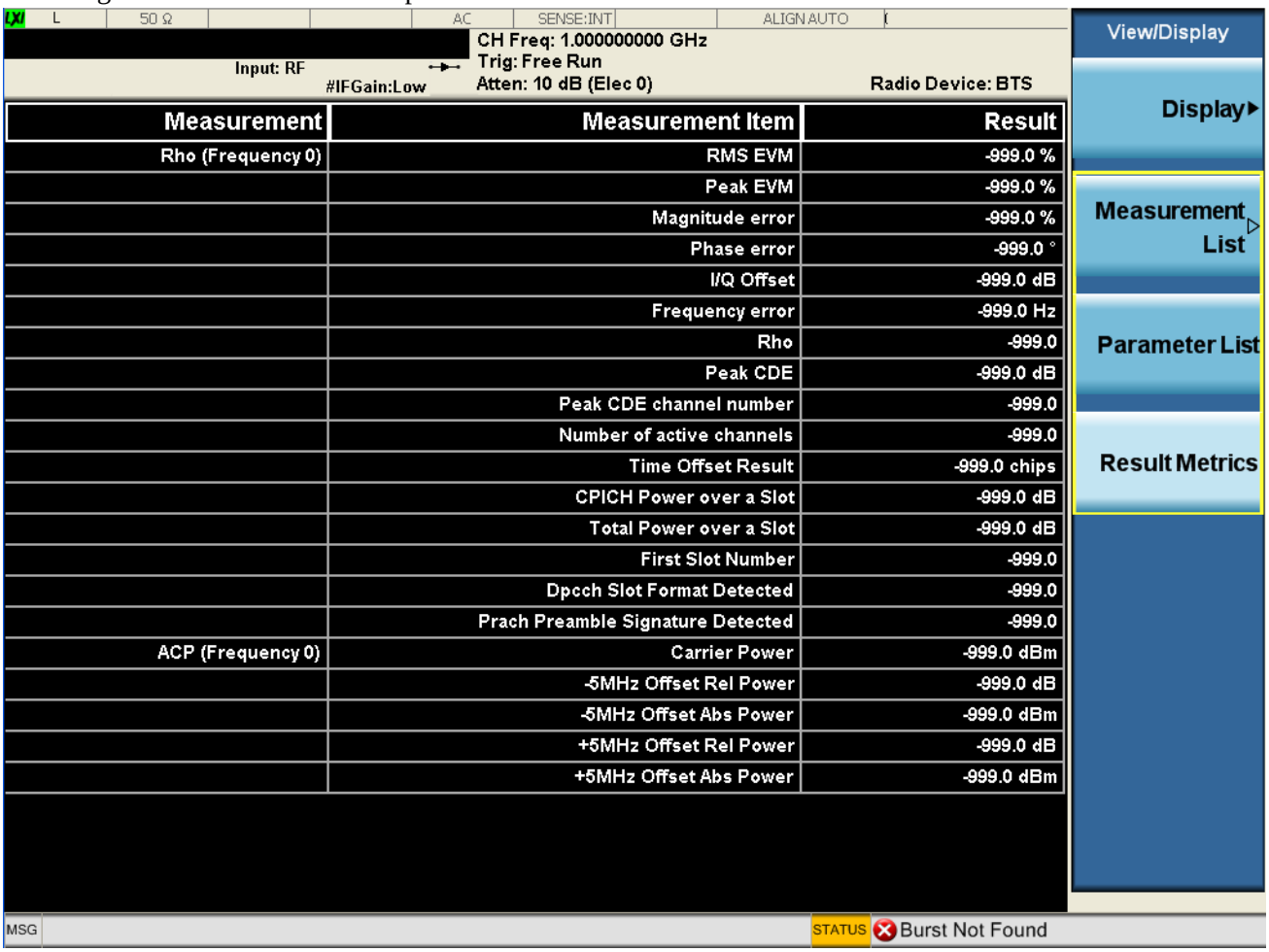
Key Path	**View/Display, Parameter List**

Mode	GSM
Initial S/W Revision	Prior to A.02.00

Result Metrics (View)

This view shows the same results that remote results(n=1) returns, in the same order.

The figure below shows an example of the Result Metrics View.



Measurement	Measurement Item	Result
Rho (Frequency 0)	RMS EVM	-999.0 %
	Peak EVM	-999.0 %
	Magnitude error	-999.0 %
	Phase error	-999.0 °
	I/Q Offset	-999.0 dB
	Frequency error	-999.0 Hz
	Rho	-999.0
	Peak CDE	-999.0 dB
	Peak CDE channel number	-999.0
	Number of active channels	-999.0
	Time Offset Result	-999.0 chips
	CPICH Power over a Slot	-999.0 dB
	Total Power over a Slot	-999.0 dB
	First Slot Number	-999.0
	Dpcch Slot Format Detected	-999.0
	Prach Preamble Signature Detected	-999.0
ACP (Frequency 0)	Carrier Power	-999.0 dBm
	-5MHz Offset Rel Power	-999.0 dB
	-5MHz Offset Abs Power	-999.0 dBm
	+5MHz Offset Rel Power	-999.0 dB
	+5MHz Offset Abs Power	-999.0 dBm

Key Path **View/Display**

View Selection Remote Commands

Allows you to select the desired measurement view from the following selections:

- **MLISt** – “Measurement List (View)” on page 239
- **PARameter** – “Parameter List (View)” on page 240

- RESult - “Result Metrics (View)” on page 242

Mode	WCDMA
Remote Command	`:DISPlay:CWCDma:VIEW[:SELect] MLISt|PARameter|RESult` `:DISPlay:CWCDma:VIEW[:SELect]?`
Example	DISP:CWCD:VIEW RES DISP:CWCD:VIEW?
Preset	RESult
State Saved	Saved in instrument state.
Range	Measurement List|Parameter List|Result Metrics
Initial S/W Revision	Prior to A.02.00

6 List Power Step Measurement

This topic contains the following sections:

List Power Step measurement results may be queried remotely by SCPI (see below) or via results displays.

For more information, see “Result Metrics View” on page 292 for the List Power Step measurement and “RF Envelope View” on page 293 for the RF Envelope measurement.

Measurement Commands for List Power Step

The following commands and queries can be used to retrieve the measurement results:

```
:CONFigure:LPSTep
:CONFigure:LPSTep:NDEFault
:INITiate:LPSTep
:FETCh:LPSTep[n]?
:MEASure:LPSTep[n]?
:READ:LPSTep[n]?
```

Remote Command Results for List Power Step

For the queries listed above, the results returned depend on the value of **n**, as follows.

n	Results Returned
not specified, or n = 1	Returns the following scalar results: 1. **Sample Interval** is a floating point number representing the time between samples when using the trace queries (n=2). 2. **Mean Power** is the mean power (in dBm). This is the power across the entire trace. If averaging is on, the power is for the latest acquisition. 3. **Mean Power Averaged** is the power (in dBm) for N averages, if averaging is on. This is the power across the entire trace. If averaging is on, the power is for the latest acquisition. If averaging is off, the value of the mean power averaged is the same as the value of the mean power. 4. **Sweep Points** is the number of data points in the swept signal. This number is useful when performing a query on the signal (i.e. when n=2). 5. **Peak-to-Mean** ratio has units of dB. This is the ratio of the maximum signal level to the mean power. Valid values are only obtained with averaging turned off. If averaging is on, the peak-to-mean ratio is calculated using the highest peak value, rather than the displayed average peak value. 6. **Maximum value** is the maximum of the most recently acquired data (in dBm). 7. **Minimum value** is the minimum of the most recently acquired data (in dBm).
n = 2	Returns trace point values of the entire captured signal envelope trace data. These data points are floating point numbers representing the power of the signal (in dBm). There are N data points, where N is the sweep points. The period between the samples is defined by the sample interval.

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

Calculate Results (Remote Query Only)

Return power results of the selected sweep. The calculated period is specified with Calculation Time Setup.

Mode	WCDMA, GSM
Remote Command	`:CALCulate:LPSTep:LIST[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21|22|23|24|25|26|27|28|29|30|31|32|33|34|35|36|37|38|39|40|41|42|43|44|45|46|47|48|49|50? [RMS]|MAXimum|MINimum`
Example	CALC:LPST:LIST2? MAX
Notes	Query only command For obtaining results efficiently, it is recommended to query this result when instrument is not sweeping during query. It is generally advisable to be in Single Sweep. Example Sequence: INIT:CONT 0 Set Parameter INIT *OPC? CALC:LPST:LIST?
Initial S/W Revision	Prior to A.02.00

Amplitude (AMPTD) Y Scale

Accesses the AMPTD Y Scale menu that allows you to set desired vertical scale settings.

For details, see the "AMPTD Y Scale" section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User's & Programmer's Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

Ref Value

Sets the absolute power reference.

Key Path	**AMPTD Y Scale**
Mode	WCDMA, GSM
Remote Command	`:DISPlay:LPSTep:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <ampl>` `:DISPlay:LPSTep:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?`
Example	DISP:LPST:VIEW:WIND:TRAC:Y:SCAL:RLEV 5dbm DISP:LPST:VIEW:WIND:TRAC:Y:SCAL:RLEV?
Couplings	When Y Auto Scaling is set to On, this value is automatically determined by the measurement result. When you set this value manually, Y Auto Scaling is automatically set to Off.
Preset	10.00
State Saved	Saved in instrument state.
Min	–250.0
Max	250.0
Initial S/W Revision	Prior to A.02.00

Attenuation

This menu controls both the electrical and mechanical attenuators and their interactions. The value read back on the key in square brackets is the current Total (Elec + Mech) attenuation. When in Pre-Adjust for Min Clip mode, this value can change at the start of every measurement.

For details, see "Attenuation" under the "AMPTD Y Scale" section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User's & Programmer's Reference, or the corresponding section of the online Help.

Key Path	**AMPTD Y Scale**

Scale/Div

Allows you to enter a numeric value to change vertical display sensitivity.

Key Path	**AMPTD Y Scale**
Mode	WCDMA, GSM
Remote Command	`:DISPlay:LPSTep:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl>` `:DISPlay:LPSTep:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?`
Example	DISP:LPST:VIEW:WIND:TRAC:Y:SCAL:PDIV 10dB DISP:LPST:VIEW:WIND:TRAC:Y:SCAL:PDIV?
Couplings	When the Y Auto Scaling is set to On, this value is automatically determined by the measurement result. When you set a value manually, Y Auto Scaling is automatically set to Off.
Preset	10.00 dB
State Saved	Saved in instrument state.
Min	0.1 dB
Max	20.00 dB
Initial S/W Revision	Prior to A.02.00

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker.

For details, see “Presel Center” under the “AMPTD Y Scale” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**AMPTD Y Scale**

Presel Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when Presel Center is available

For details, see “Presel Adjust” under the “AMPTD Y Scale” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**AMPTD Y Scale**

Internal Preamp

This menu controls the internal preamplifier. Turning Internal Preamp on gives a better noise figure, but a poorer inter-modulation distortion (TOI) to noise floor dynamic range. You can optimize this setting for your particular measurement.

For details, see “Internal Preamp” under the “AMPTD Y Scale” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**AMPTD Y Scale**

Ref Position

Allows you to set the display reference position to the top, center, or bottom of the display.

Key Path	**AMPTD Y Scale**
Mode	WCDMA, GSM
Remote Command	`:DISPlay:LPSTep:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP|CENTer|BOTTom` `:DISPlay:LPSTep:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition?`
Example	DISP:LPST:VIEW:WIND:TRAC:Y:SCAL:RPOS CENT DISP:LPST:VIEW:WIND:TRAC:Y:SCAL:RPOS?
Preset	TOP
State Saved	Saved in instrument state.
Range	Top|Ctr|Bot
Initial S/W Revision	Prior to A.02.00

Auto Scaling

Allows you to toggle the Y axis Auto Scaling function between On and Off.

Key Path	**AMPTD Y Scale**
Mode	WCDMA, GSM
Remote Command	`:DISPlay:LPSTep:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0|1|OFF|ON` `:DISPlay:LPSTep:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle?`

Example	DISP:LPST:VIEW:WIND:TRAC:Y:COUP 0 DISP:LPST:VIEW:WIND:TRAC:Y:COUP?
Couplings	When Auto Scaling is On, and you press the **Restart** front-panel key, this function automatically determines the scale per division and reference values based on the measurement results. When you manually set a value for the Y Rel Value or Y Scale/Div, this parameter is automatically set to Off.
Preset	OFF
State Saved	Saved in instrument state.
Range	On|Off
Initial S/W Revision	Prior to A.02.00

Auto Couple

For details, see the “Auto Couple” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

BW

Allows you to control the Information Bandwidth and Video Bandwidth functions of the instrument.

Key Path	**Front-panel key**

Info BW (Remote Command Only)

Enables you to manually set the information bandwidth of the instrument.

Mode	WCDMA, GSM
Remote Command	`[:SENSe]:LPSTep:BANDwidth[:RESolution] <freq>` `[:SENSe]:LPSTep:BANDwidth[:RESolution]?`
Example	LPST:BAND 10 LPST:BAND?
Notes	You must be in the GSM or WCDMA mode to use this command. Use INSTrument:SELect to set the mode.
Preset	1MHz
State Saved	Saved in instrument state.
Min	10 Hz
Max	8 MHz
Initial S/W Revision	Prior to A.02.00

Filter Type (Remote Command Only)

Selects the type of bandwidth filter that is used. The choices are Gaussian or Flat top.

Mode	WCDMA, GSM
Remote Command	`[:SENSe]:LPSTep:BANDwidth:SHAPe GAUSsian|FLATtop` `[:SENSe]:LPSTep:BANDwidth:SHAPe?`
Example	LPST:BAND:SHAP FLAT LPST:BAND:SHAP?
Preset	GAUS
State Saved	Saved in instrument state.
Range	Gaussian|Flattop
Initial S/W Revision	Prior to A.02.00

Video BW (Remote Command Only)

Allows you to change the instrument post-detection filter (VBW).

Mode	WCDMA, GSM
Remote Command	`[:SENSe]:LPSTep:BANDwidth:VIDeo <freq>` `[:SENSe]:LPSTep:BANDwidth:VIDeo?`
Example	LPST:BAND:VID 1MHz LPST:BAND:VID?
Preset	1MHz
State Saved	Saved in instrument state.
Min	1Hz
Max	50MHz
Initial S/W Revision	Prior to A.02.00

Cont (Continuous Measurement/Sweep)

Operation of this key is identical across all measurements.

For details, see the “Cont” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

FREQ Channel

For details, see the “FREQ Channel” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

Input/Output

For details, see the “Input/Output” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

Marker

There are no Markers implemented for this measurement, so, when pressed, this front-panel key displays a blank menu.

Key Path	**Front-panel key**

Marker Function

There are no Marker Functions implemented for this measurement, so, when pressed, this front-panel key displays a blank menu.

Key Path	**Front-panel key**

Marker To

There is no Marker To functionality implemented for this measurement, so, when pressed, this front-panel key displays a blank menu.

Key Path	**Front-panel key**

Meas

Operation of this key is identical across all measurements.

For details, see the “Meas” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

Meas Setup

There are no keys for Meas Setup functions, so, when pressed, this key displays a blank menu.

All front-panel measurement setup is performed using the menus displayed alongside the “Measurement List View” on page 289 and “Parameter List View” on page 290.

Key Path	**Front-panel key**

Avg/Hold Num (Remote Command Only)

Sets the number of data acquisitions that will be averaged. After the specified number of average counts, the average mode (termination control) setting determines the average action.

Mode	WCDMA, GSM

Remote Command	`[:SENSe]:LPSTep:AVERage:COUNt <integer>`
	`[:SENSe]:LPSTep:AVERage:COUNt?`
	`[:SENSe]:LPSTep:AVERage[:STATe] OFF|ON|0|1`
	`[:SENSe]:LPSTep:AVERage[:STATe]?`

Example	LPST:AVER:COUN 3 LPST:AVER:COUN? LPST:AVER ON LPST:AVER?
Notes	You must be in the WCDMA or GSM mode to use this command. Use INSTrument:SELect to set the mode.
Couplings	When this value is changed, Avg State is set to On.
Preset	10 OFF
State Saved	Saved in instrument state.
Min	1
Max	20001
Initial S/W Revision	Prior to A.02.00

Average Mode (Remote Command Only)

Select the type of termination control used to averaging. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

Mode	WCDMA, GSM

Remote Command	`[:SENSe]:LPSTep:AVERage:TCONtrol EXPonential|REPeat` `[:SENSe]:LPSTep:AVERage:TCONtrol?`
Example	LPST:AVER:TCON REP LPST:AVER:TCON?
Notes	• **EXPonential** - When Measure is set at Cont, data acquisitions will continue indefinitely. After N averages, exponential averaging is used with a weighting factor of N (the displayed average count stops at N). Exponential averaging weights new data more than old data, which allows tracking of slow-changing signals. The weighting factor N is set using the Averages, Avg Bursts key. • **REPeat** - When Measure is set at Cont, data acquisitions will continue indefinitely. After N averages is reached, all previous result data is cleared and the average count is set back to 1. This is equivalent to being in Measure Single and pressing the Restart key when the Single measurement finishes.
Preset	EXPonential
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Average Type (Remote Command Only)

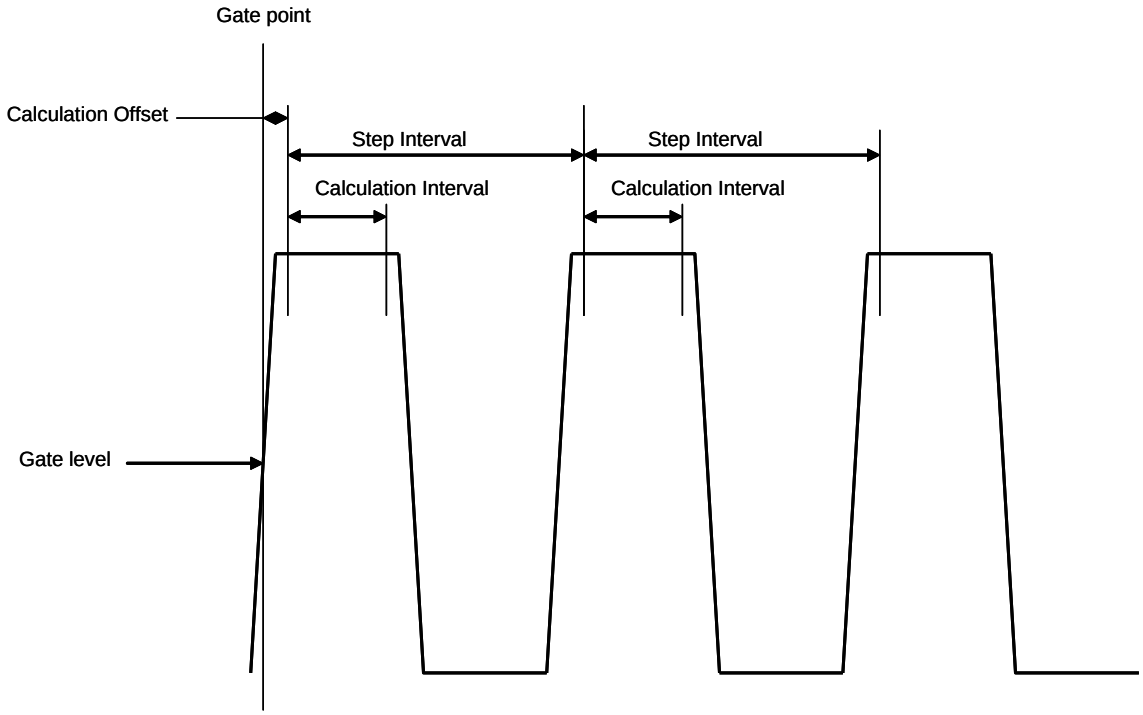
Specifies the type of trace and result averaging to use.

This parameter is valid only for Measure Trace.

Mode	WCDMA, GSM
Remote Command	`[:SENSe]:LPSTep:AVERage:TYPE LOG|RMS` `[:SENSe]:LPSTep:AVERage:TYPE?`
Example	LPST:AVER:TYPE LOG LPST:AVER:TYPE?
Notes	• **LOG** - simulates the traditional spectrum analyzer type of averaging by averaging the log of the power. • **RMS** - true power averaging that is equivalent to taking the RMS value of the voltage. It is the most accurate type of averaging.
Preset	RMS
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Calculation Time Setup

Allows you to specify the period to be calculated for the swept trace.



Key Path **Meas Setup**

Step Interval (Remote Command Only)

Step Interval is a real number in seconds. It defines the beginning of the next field of trace elements to be calculated. This is relative to the beginning of the previous field.

Mode	WCDMA, GSM
Remote Command	`[:SENSe]:LPSTep:SWEep:STEP:TIME <time>` `[:SENSe]:LPSTep:SWEep:STEP:TIME`
Example	LPST:SWE:STEP:TIME 0.001 LPST:SWE:STEP:TIME?
Preset	500 us
State Saved	Saved in instrument state.
Min	1 ns
Max	1s
Initial S/W Revision	Prior to A.02.00

Calculation Offset (Remote Command Only)

Calculation Offset is a real number in seconds. It specifies the amount of data points at the beginning of the gated sweep that will be ignored before the calculation process starts.

Mode	WCDMA, GSM
Remote Command	`[:SENSe]:LPSTep:LIST:SWEep:STEP:OFFSet <time>, …` `[:SENSe]:LPSTep:LIST:SWEep:STEP:OFFSet?`
Example	LPST:LIST:SWE:STEP:OFFS 0.00005,0.00005 LPST:LIST:SWE:STEP:OFFS?
Preset	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
State Saved	Saved in instrument state.
Min	0 s
Max	1 s
Initial S/W Revision	Prior to A.02.00

Calculation Interval (Remote Command Only)

Calculation Interval is a real number in seconds. It defines how much data points will be calculated into one value.

Mode	WCDMA, GSM
Remote Command	`[:SENSe]:LPSTep:SWEep:STEP:LENGth <time>` `[:SENSe]:LPSTep:SWEep:STEP:LENGth?`
Example	LPST:SWE:STEP:LENG 0.00004 LPST:SWE:STEP:LENG?
Preset	250 us
State Saved	Saved in instrument state.
Min	1 ns
Max	1 s
Initial S/W Revision	Prior to A.02.00

List Setup

Key Path	**Meas Setup**

Number of Steps (Remote Command Only)

Allows you to set the number of periods to be calculated in a sweep.

Mode	WCDMA, GSM
Remote Command	`[:SENSe]:LPSTep:LIST:STEP <integer>, …` `[:SENSe]:LPSTep:LIST:STEP?`
Example	LPST:LIST:STEP 10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10 LPST:LIST:STEP?
Preset	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1
State Saved	Saved in instrument state.
Min	1
Max	100
Initial S/W Revision	Prior to A.02.00

Sweep State (Remote Command Only)

The command defines a list of state at which the sweep is made.

Mode	WCDMA, GSM
Remote Command	`[:SENSe]:LPSTep:LIST:STATe ON|OFF|1|0, …` `[:SENSe]:LPSTep:LIST:STATe?`
Example	LPST:LIST:STAT 1,1,1,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 LPST:LIST:STAT?
Notes	The state of the first list doesn't change to OFF|0.
Preset	1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Sweep Frequency (Remote Command Only)

The command defines a list of center frequencies at which the sweep is made.

Mode	WCDMA, GSM
Remote Command	`[:SENSe]:LPSTep:LIST:FREQuency <freq>, …` `[:SENSe]:LPSTep:LIST:FREQuency?`
Example	LPST:LIST:FREQ 1e9, 2e9, 3e9 LPST:LIST:FREQ?
Notes	The **Center Frequency** setting under the **FREQ Channel** front panel key or [:SENSe]:FREQuency:CENTer overwrites the first frequency in this list. Any values less than 3.6GHz can be set. Note that when Sweep E-ATT has a cycle consisting of n values, then the same Sweep Frequency should be repeated n times. [Example of the combination of Sweep Frequency and E-ATT] N=1 (No cycle) Sweep Frequency 1GHz, 1.5GHz, 2GHz, 2.5GHz, 3GHz, 3.5GHz Sweep E-ATT 20, 20, 20, 20, 20, 20 N=3 cycle Sweep Frequency 1GHz, 1GHz, 1GHz, 2GHz, 2GHz, 2GHz, 3GHz, 3GHz, 3GHz Sweep E-ATT 20, 0, 20, 20, 0, 20, 20, 0, 20 N=5 cycle Sweep Frequency 1GHz, 1GHz, 1GHz, 1GHz, 1GHz, 2GHz, 2GHz, 2GHz, 2GHz, 2GHz Sweep E-ATT 20, 0, 20, 20, 0, 20, 0, 20, 20, 0 N=10 cycle Sweep Frequency 1GHz, 1GHz, 1GHz, 1GHz, 1GHz, 1GHz, 1GHz, 1GHz, 1GHz, 2GHz, 2GHz, 2GHz, 2GHz, 2GHz, 2GHz, 2GHz, 2GHz, 2GHz, 2GHz, 2GHz Sweep E-ATT 20, 0, 20, 0, 0, 20, 20, 20, 20, 0, 20, 0, 20, 0, 0, 20, 20, 20, 20, 0

Preset	WCDMA: 1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9,1e9 GSM: 935.2MHz,935.2MHz
State Saved	Saved in instrument state.
Min	–79.999995 MHz
Max	3.6GHz
Initial S/W Revision	Prior to A.02.00

Sweep Time (Remote Command Only)

This command defines a list of sweep time settings at which the sweep is made.

Mode	WCDMA, GSM
Remote Command	`[:SENSe]:LPSTep:LIST:TIME <time>, …` `[:SENSe]:LPSTep:LIST:TIME?`
Example	LPST:LIST:TIME 10e–4,10e–4 LPST:LIST:TIME?
Preset	10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms,10ms
Min	1us
Max	0.5
Initial S/W Revision	Prior to A.02.00

Sweep E-ATT (Remote Command Only)

This command defines a list of electric attenuator settings at which the sweep is made. The value must be 0 or 20.

Mode	WCDMA, GSM
Remote Command	`[:SENSe]:LPSTep:LIST:EATTen <rel_ampl>, …` `[:SENSe]:LPSTep:LIST:EATTen`
Example	LPST:LIST:EATT 20,0,20,0,20,0,20,0 LPST:LIST:EATT?
Notes	Either 20dB or 0 dB can be set for each value. When Sweep E-ATT has a cycle consisting of n values, then the same Sweep Frequency should be repeated n times. See examples in Notes of Sweep Frequency.
Preset	20dB,0dB,20dB,0dB,20dB,0dB,20dB,0dB,20dB,0dB,20dB,0dB,20dB ,0dB,20dB,0dB,20dB,0dB,20dB,0dB,20dB,0dB,20dB,0dB,20dB,0dB, 20dB,0dB,20dB,0dB,20dB,0dB,20dB,0dB,20dB,0dB,20dB,0dB,20dB ,0dB,20dB,0dB,20dB,0dB,20dB,0dB,20dB,0dB,20dB,0dB
State Saved	Saved in instrument state.
Min	0
Max	20
Initial S/W Revision	Prior to A.02.00

Gate Source (Remote Command Only)

This command defines a list of gate source settings at which the sweep is made.

Mode	WCDMA, GSM
Remote Command	`[:SENSe]:LPSTep:LIST:GATE:SOURce IMMediate|EXTernal1|EXTernal2|RFBurst|FRAMe, …` `[:SENSe]:LPSTep:LIST:GATE:SOURce?`
Example	LPST:LIST:GATE:SOUR RFB,IMM,RFB,IMM LPST:LIST:GATE:SOUR?

Notes	One or any two types of Gate Sources can be set. When two sources are set, in accordance with the Ns cycle, each combination must include one source and the other repeated Ns–1 times. [Example] No cycle RFB, RFB, RFB,RFB,,, Ns=2 cycle EXT, IMM, EXT, IMM, EXT, IMM, EXT, IMM EXT1, EXT2, EXT1, EXT2, EXT1, EXT2, EXT1, EXT2 Ns=5 cycle RFB, IMM, IMM, IMM, IMM, RFB, IMM, IMM, IMM, IMM
Preset	IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM, IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM, IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM, IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM, IMM,IMM
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Gate Recovery Time (Remote Command Only)

It defines the recovery time until next sweep starts.

Mode	WCDMA, GSM
Remote Command	`[:SENSe]:LPSTep:LIST:GATE:RTIMe <time>, …` `[:SENSe]:LPSTep:LIST:GATE:RTIMe?`
Example	LPST:LIST:GATE:RTIM 2e–6, 1e–3 LPST:LIST:GATE:RTIM?

Notes	One or any two values can be set. When two values are set, in accordance with the Nr cycle, each combination must include one value repeated Nr–1 times and one another value. [Example] No cycle 2u, 2u, 2u, 2u, 2u, 2u,,, Nr=3 cycle 2u, 2u, 500u, 2u, 2u, 500u, 2u, 2u, 500u Nr=6 cycle 10u, 10u, 10u, 10u, 10u, 100u, 10u, 10u, 10u, 10u, 10u, 100u
Preset	0.5ms,0.5ms
State Saved	Saved in instrument state.
Min	2us
Max	500 ms
Initial S/W Revision	Prior to A.02.00

IF Gain

Sets the IF Gain function to Auto, Low Gain or High Gain. These settings affect sensitivity and IF overloads.

Key Path	**Meas Setup**

IF Gain Auto (Remote Command Only)

Activates the auto rules for IF Gain. When Auto is active, the IF Gain is set to High Gain under the following conditions:

- The input attenuator is set to 0 dB
- The preamp is turned On and the frequency range is under 3.6 GHz

For other settings, Auto sets the IF Gain to Low Gain.

Mode	WCDMA, GSM
Remote Command	`[:SENSe]:LPSTep:IF:GAIN:AUTO[:STATe] ON|OFF|1|0` `[:SENSe]:LPSTep:IF:GAIN:AUTO[:STATe]?`

Example	LPST:IF:GAIN:AUTO ON LPST:IF:GAIN:AUTO?
Preset	ON
State Saved	Saved in instrument state.
Range	On|Off
Initial S/W Revision	Prior to A.02.00

IF Gain State (Remote Command Only)

Selects the range of IF gain.

Mode	WCDMA, GSM
Remote Command	`[:SENSe]:LPSTep:IF:GAIN[:STATe] AUTOrange|LOW|HIGH` `[:SENSe]:LPSTep:IF:GAIN[:STATe]?`
Example	LPST:IF:GAIN HIGH LPST:IF:GAIN?
Notes	• **AUTO** – slower follows signals • **LOW** – best for large signals • **HIGH** – best noise level
Preset	AUTOrange
State Saved	Saved in instrument state.
Range	Autorange|Low|High
Initial S/W Revision	Prior to A.02.00

Meas Preset (Remote Command Only)

Restores all the measurement parameters to their default values.

For details, see “Meas Preset” under the “Meas Setup” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Mode	WCDMA, GSM
Remote Command	`:CONFigure:LPSTep`
Example	CONF:LPST
Notes	You must be in the WCDMA or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Initial S/W Revision	Prior to A.02.00

Mode

Operation of this key is identical across all measurements.

For details, see the “Mode” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

Mode Setup

Operation of this key is identical across all measurements.

For details, see the “Mode Setup” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

Peak Search

There is no Peak Search functionality implemented for this measurement, so, when pressed, this front-panel key displays a blank menu.

Key Path	**Front-panel key**

Recall

Operation of this key is identical across all measurements.

For details, see the “Recall” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

Restart

Operation of this key is identical across all measurements.

For details, see the “Restart” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

Save

Operation of this key is identical across all measurements.

For details, see the “Save” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

Single (Single Measurement/Sweep)

Operation of this key is identical across all measurements.

For details, see the “Single” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

Source

There is no Source functionality for this application, so, when pressed, this front-panel key displays a blank menu.

Key Path	**Front-panel key**

SPAN X Scale

Accesses the SPAN/X Scale menu, which allows you to set the desired horizontal scale settings.

When any view other than "RF Envelope View" on page 293 is selected, this menu is blank.

Key Path	**Front-panel key**

Ref Value

Allows you to set the display X reference value.

Key Path	**SPAN X Scale**
Mode	WCDMA, GSM
Remote Command	`:DISPlay:LPSTep:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel <time>` `:DISPlay:LPSTep:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel?`
Example	DISP:LPST:VIEW:WIND:TRAC:X:RLEV 1 DISP:LPST:VIEW:WIND:TRAC:X:RLEV?
Notes	If X Auto Scaling is On, this value is automatically determined by the measurement result. When a value is set manually, X Auto Scaling is automatically set to Off.
Couplings	See Notes
Preset	Automatically calculated
State Saved	Saved in instrument state.
Min	–1s
Max	10s
Initial S/W Revision	Prior to A.02.00

Scale/Div

Allows you to set the display X scale/division value.

Key Path	**SPAN X Scale**
Mode	WCDMA, GSM

Remote Command	`:DISPlay:LPSTep:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision <time>` `:DISPlay:LPSTep:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision?`
Example	DISP:LPST:VIEW:WIND:TRAC:X:PDIV 1ms DISP:LPST:VIEW:WIND:TRAC:X:PDIV?
Notes	If X Auto Scaling is set to On, this value is automatically determined by the measurement result. When a value is set manually, X Auto Scaling is automatically set to Off.
Couplings	See Notes
Preset	Automatically calculated
State Saved	Saved in instrument state.
Min	1.00 ns
Max	1.00 s
Initial S/W Revision	Prior to A.02.00

Ref Position

Allows you to set the X reference position to the left, center, or right of the display.

Key Path	**SPAN X Scale**
Mode	WCDMA, GSM
Remote Command	`:DISPlay:LPSTep:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RPOSition LEFT|CENTer|RIGHt` `:DISPlay:LPSTep:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RPOSition?`
Example	DISP:LPST:VIEW:WIND:TRAC:X:RPOS LEFT DISP:LPST:VIEW:WIND:TRAC:X:RPOS?
Preset	LEFT
State Saved	Saved in instrument state.
Range	Left|Ctr|Right
Initial S/W Revision	Prior to A.02.00

Auto Scaling

Allows you to toggle the X Auto Scaling function between On and Off.

Key Path	**SPAN X Scale**
Mode	WCDMA, GSM
Remote Command	`:DISPlay:LPSTep:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUPle 0|1|OFF|ON` `:DISPlay:LPSTep:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUPle?`
Example	DISP:LPST:VIEW:WIND:TRAC:X:COUP OFF DISP:LPST:VIEW:WIND:TRAC:X:COUP?
Notes	Upon pressing the **Restart** front-panel key, or Restart softkey under the Meas Control menu, the scale coupling function automatically determines the scale per division and reference values, based on the measurement results, if this parameter is set to On. When you manually set a value to either X Rel Value or X Scale/Div, X Auto Scaling is automatically set to Off.
Couplings	See Notes
Preset	ON
State Saved	Saved in instrument state.
Range	On|Off
Initial S/W Revision	Prior to A.02.00

Sweep/Control

For details, see the “Sweep/Control” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

Points (Remote Command Only)

Sets the number of points per sweep, from 1 to 20001. The sweep time and calculation time resolution setting will depend on the number of points selected.

Mode	WCDMA, GSM
Remote Command	`[:SENSe]:LPSTep:SWEep:POINts <integer>` `[:SENSe]:LPSTep:SWEep:POINts?`
Example	LPST:SWE:POIN 1005 LPST:SWE:POIN?
Preset	1001
State Saved	Saved in instrument state.
Min	100
Max	20001
Initial S/W Revision	Prior to A.02.00

Trace/Detector

For general details, see the “Trace/Detector” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help. For this measurement, the Trace/Detector menu is blank.

Key Path	**Front-panel key**

Detector (Remote Command Only)

Selects a detector.

Mode	WCDMA, GSM
Remote Command	`[:SENSe]:LPSTep:DETector[:FUNCtion] AVERage|NEGative|SAMPle|NORMal|POSitive` `[:SENSe]:LPSTep:DETector[:FUNCtion]?`
Example	LPST:DET NEG LPST:DET?
Preset	AVERage
State Saved	Saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Trigger

Selects the trigger source and trigger setup functionality.

For details, see the “Trigger” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**Front-panel key**

View/Display

The View/Display menu provides access to available view selections and their controls. This menu also includes the **Display** key, which opens a submenu that allows you to modify display settings.

View Selections

There are 4 available view types:

- “Measurement List View” on page 289
- “Parameter List View” on page 290
- “Result Metrics View” on page 292
- “RF Envelope View” on page 293

For details of Remote Commands for view selection, see “View Selection Remote Commands” on page 294.

Key Path	**Front-panel key**

Display

Key Path	**View/Display**

Title

For details of the keys in this menu (except “Change Title” on page 288 below), see "Title" under the “View/Display > Display” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

Key Path	**View/Display**, **Display**

Change Title

Accesses an Alpha Editor menu that enables you to write a title across the top of the display.

For more details, see "Change Title" under the “View/Display > Display > Title” section of the N9073A & W9073A W-CDMA & HSPA Measurement Applications User’s & Programmer’s Reference, or the corresponding section of the online Help.

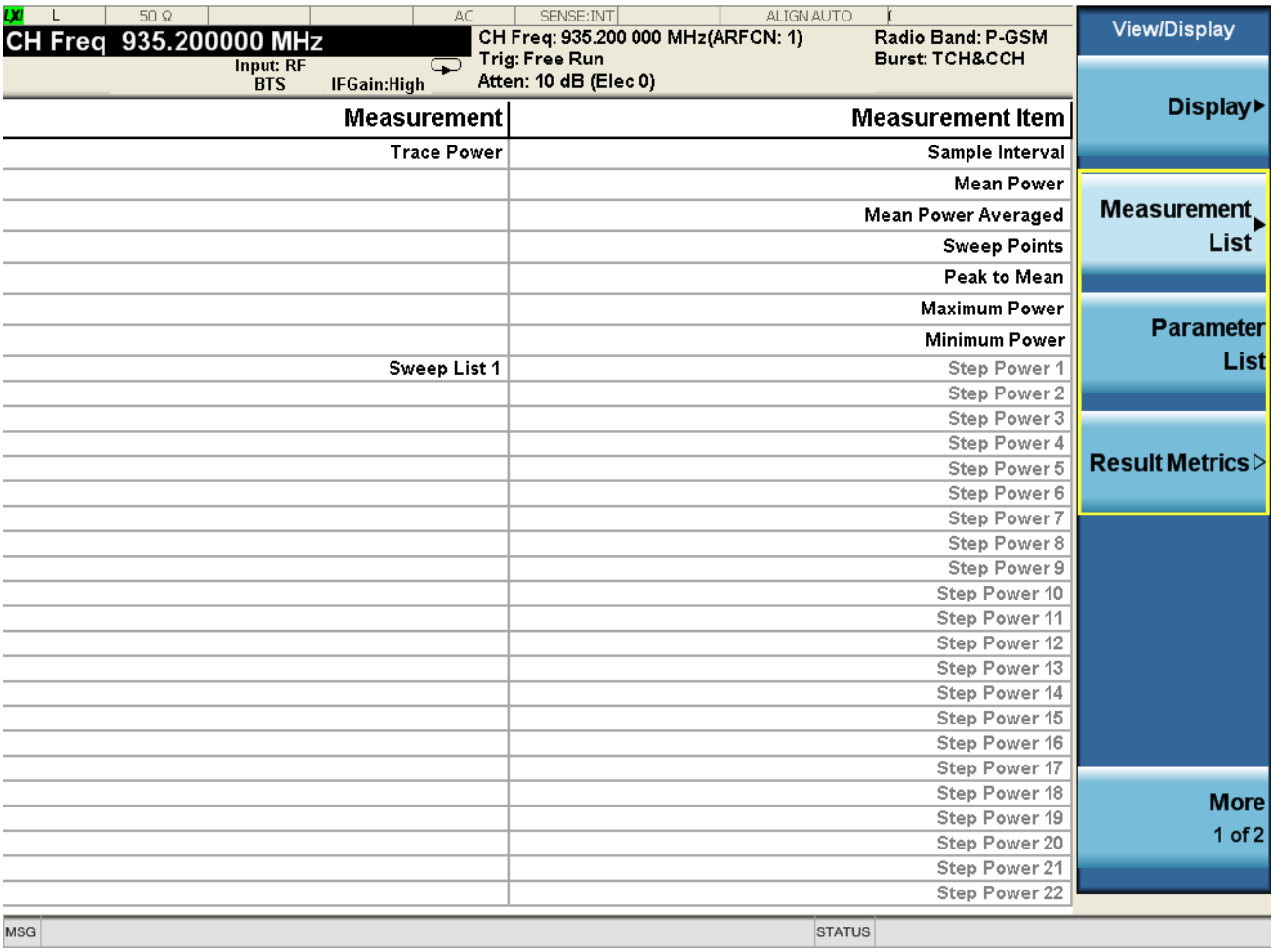
Key Path	**View/Display, Display, Title**
Mode	WCDMA, GSM
Remote Command	`:DISPlay:LPSTep:ANNotation:TITLe:DATA <string>` `:DISPlay:LPSTep:ANNotation:TITLe:DATA?`
Example	DISP:LPST:ANN:TITL:DATA “List Power Step” DISP:LPST:ANN:TITL:DATA?

Preset	List Power Step
State Saved	Saved in instrument state.
Range	Uppercase, Lowercase, Numeric, Symbol
Initial S/W Revision	Prior to A.02.00

Measurement List View

This view shows the results of currently enabled measurements.

If “Show All Items” parameter is enabled from the soft key, all available measurements and results are displayed. When a measurement is disabled, the measurement name and results for the disabled measurement are grayed out.



Key Path **View/Display**

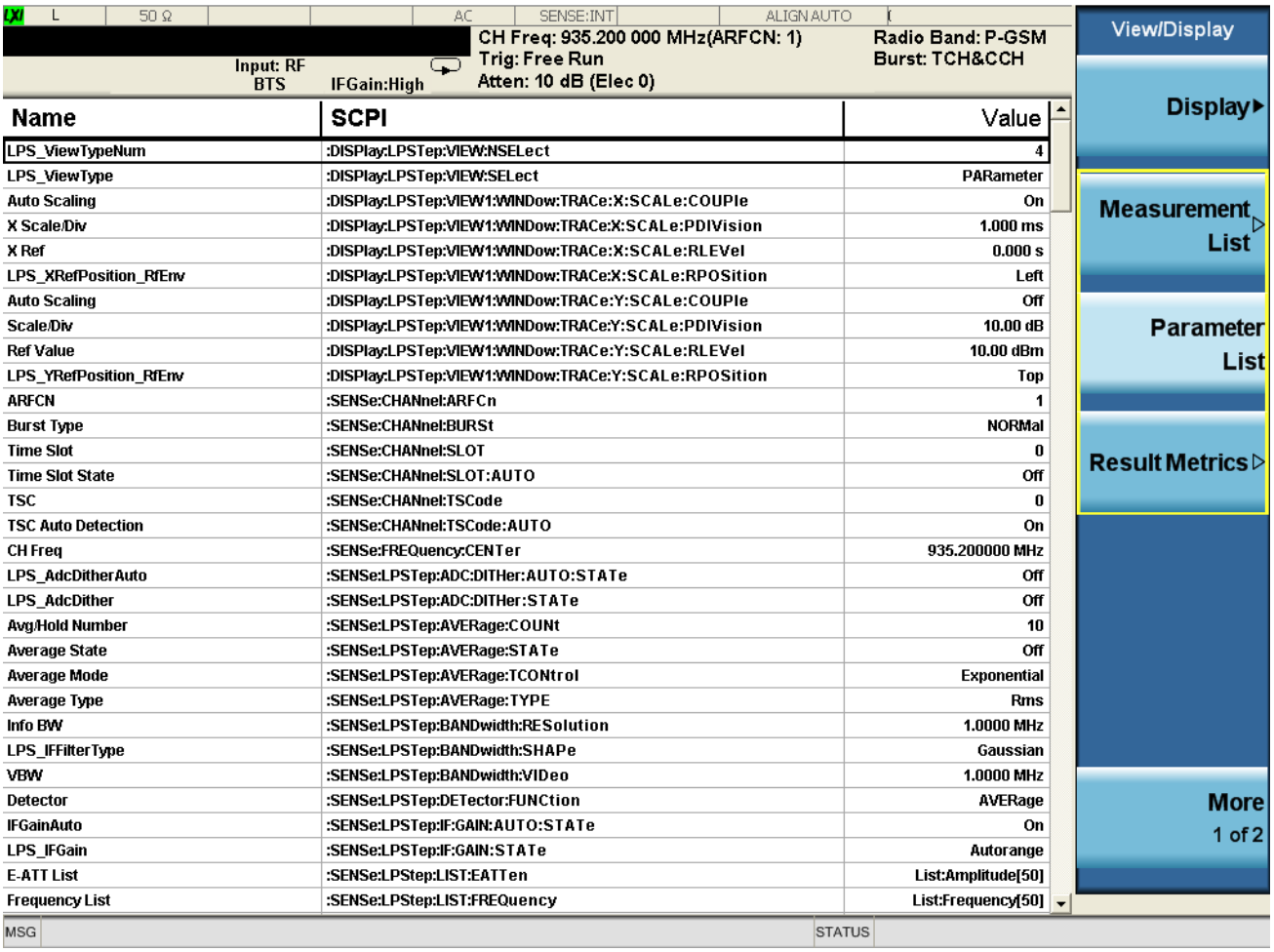
Show All Items

Allows you to specify display settings of the Measurement List view. In default (OFF), the current status of enabled measurements, items, limit settings and pass fail states are displayed.

Key Path	**View/Display, Measurement List**
Mode	GSM
Preset	OFF
State Saved	Saved in instrument state.
Range	On|Off
Initial S/W Revision	Prior to A.02.00

Parameter List View

This view shows the name, remote commands and values of all available commands for the current measurement. You can verify and change values in the table by using front-panel keys, or a mouse and keyboard.



Key Path	**View/Display**

Index

Allows you to specify an index of array for editing the value of specified index. This key only appears when a list type of SCPI is selected on Parameter List view. Maximum number of this index corresponds to the length of selected SCPI.

Key Path	**View/Display, Parameter List**
Mode	GSM
Initial S/W Revision	Prior to A.02.00

Value

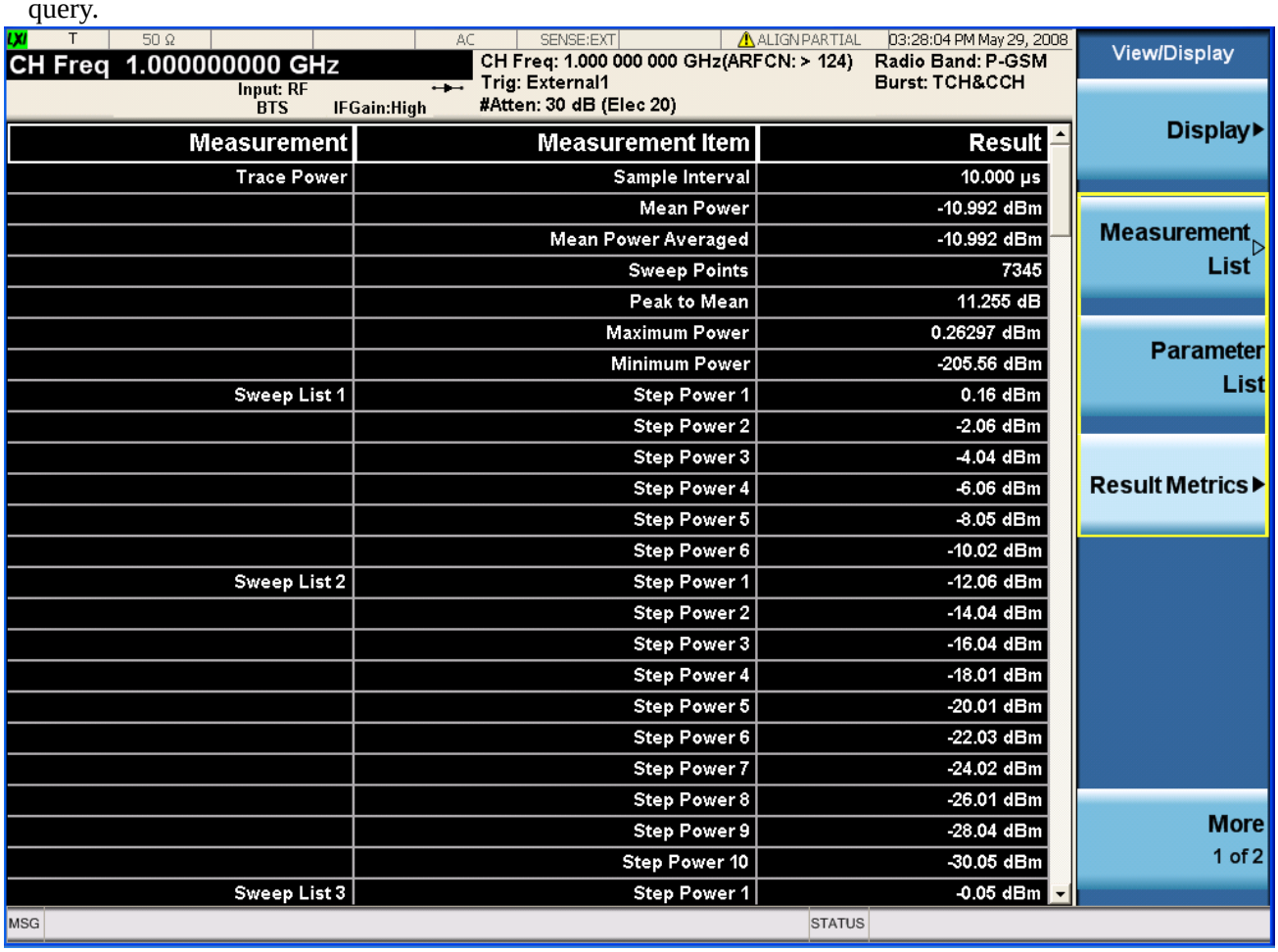
Allows you to edit the value of selected SCPI on Parameter List view.

Key Path	**View/Display, Parameter List**

Mode	GSM
Initial S/W Revision	Prior to A.02.00

Result Metrics View

This view displays measurement results in the same order as they are returned by the remote results (n=1) query.



Key Path	**View/Display**

Result Type

Allows you to choose type of power displayed in the Result Metrics view.

Key Path	**View/Display, Result Metrics**
Mode	WCDMA, GSM
Remote Command	`:DISPlay:LPSTep:VIEW:RESType RMS|MAXimum|MINimum` `:DISPlay:LPSTep:VIEW:RESType?`

Example	DISP:LPST:VIEW:REST MAX DISP:LPST:VIEW:REST?
Preset	RMS
State Saved	Saved in instrument state.
Range	RMS|Max|Min
Initial S/W Revision	Prior to A.02.00

RF Envelope View

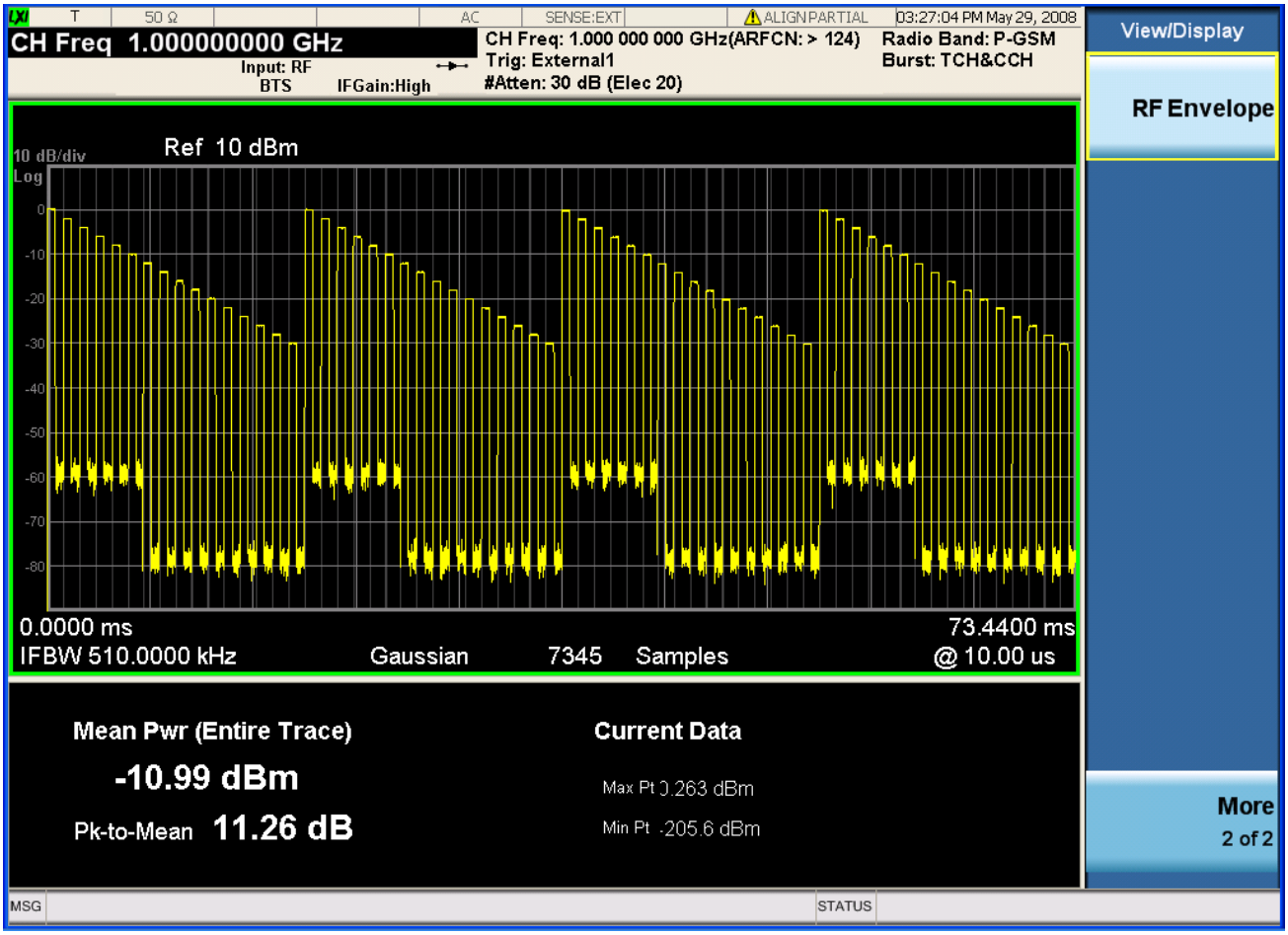
This view shows a time-domain magnitude trace that is connected to multiple gated sweeps by setting of List Setup parameters.

The gray vertical bars show the calculation period of related power results.

As shown in the example below, this view has 2 windows:

"Trace Window" on page 294

"Results Window" on page 294



Trace Window

Corresponding Trace	yellow – n=2

Results Window

Name	Corresponding Results	Display Format
Meas Pwr (Entire Trace)	n=1, 2nd item Meas power across the entire trace in dBm	XX.XX dBm
Pk-to-Mean	n=1, 5th item The ratio of the maximum signal level to the mean power in dB.	XX.XX dB
Current Data Max	n=1, 6th item Maximum value of the most recently acquired data in dBm	XX.XX dBm
Current Data Min	n=1, 7th item Minimum value of the most recently acquired data in dBm	XX.XX dBm

Key Path	**View/Display**

View Selection Remote Commands

Allows you to select the desired measurement view from the following selections:

- MLISt – Measurement List View
- PARameter – Parameter List View
- RESult - Result Metrics View
- RFENvelope - RF Envelope View

Key Path	**View/Display**
Mode	WCDMA, GSM
Remote Command	`:DISPlay:LPSTep:VIEW[:SELect] MLISt|PARameter|RESult|RFENvelope` `:DISPlay:LPSTep:VIEW[:SELect]?`

Example	DISP:LPST:VIEW RES DISP:LPST:VIEW?
Preset	RESult
State Saved	Saved in instrument state.
Range	Measurement List|Parameter List|Result Metrics|RF Envelope
Initial S/W Revision	Prior to A.02.00

7 References

Documents & Web Sites

1. **IEEE Standard 488.2–1992**

   IEEE Standard Codes, Formats, Protocols, and Common Commands for Use With IEEE Std 488.1-1987, IEEE Standard Digital Interface for Programmable Instrumentation

   May be downloaded in Acrobat (PDF) format from:

   ieeexplore.ieee.org/iel1/2839/5581/00213762.pdf?arnumber=213762

2. **Agilent/Keysight X-Series Document Library**

   Select one of the following hyperlinks, depending on the product name of your instrument:

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

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

3. **Keysight X-Series Signal Analyzer: Getting Started Guide**

   Agilent/Keysight Technologies Inc. 2008-2014. Part Number: subject to change as document is revised.

   There are two separate versions of the Getting Started Guide; one for instruments with Windows XP operating systems, and another for instruments with Windows 7 operating systems. A printed copy of the appropriate document is supplied with each Agilent/Keysight X-Series Analyzer.

   The documents are also available in Acrobat (PDF) form:

   - On the Documentation DVD supplied with each instrument,
   - On the instrument's disk drive at the following location:

     Windows XP:

     C:\Program Files\Agilent\SignalAnalysis\Infrastructure\Help\bookfiles\getstart.pdf

     Windows 7:

     C:\Program Files\Agilent\SignalAnalysis\Infrastructure\Help\bookfiles\getstart2.pdf
   - Via download from:

     Windows XP:

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

     Windows 7:

     http://www.keysight.com/find/xseries_getting_started_guide_windows7

4. **Instrument Messages**

   Keysight Technologies Inc. 2008-2014. Part Number: N9020-90095

   Available in Acrobat (PDF) form:

   - On the Documentation DVD supplied with each instrument,
   - On the instrument's disk drive at the following location:

     C:\Program Files\Agilent\SignalAnalysis\Infrastructure\Help\bookfiles\messages.pdf
   - Via download from:

     http://cp.literature.keysight.com/litweb/pdf/N9020-90095.pdf

5. **X-Series Programmer's Guide**

   Keysight Technologies Inc. 2008-2013. Part Number: N9020-90112

   May be downloaded in Acrobat (PDF) format from:

   http://cp.literature.keysight.com/litweb/pdf/N9020-90112.pdf

6. **N9073A & W9073A W-CDMA & HSPA Measurement Applications User's & Programmer's Reference**

   Agilent /KeysightTechnologies Inc. 2008-2013. Part Number: N9073-90016

   May be downloaded in Acrobat (PDF) format from:

   http://cp.literature.keysight.com/litweb/pdf/N9073-90016.pdf

7. **Agilent/Keysight I/O Libraries Suite**

   Agilent/Keysight Technologies Inc.

   All Agilent/KeysightVISA, VISA COM, SICL and 488 documentation is included in HTML Help (CHM) format in the Agilent/Keysight I/O Libraries Suite installer, which may be downloaded from:

   www.keysight.com/find/iosuite

   After installing the libraries suite, you can access the help by clicking the IO taskbar icon, then selecting `Documentation > API Documentation > VISA Documentation` from the popup menus.